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<input checked="" type="checkbox"/>	NO EXCEPTIONS TAKEN	<input type="checkbox"/>	NOTE MARKINGS
<input type="checkbox"/>	NOTE MARKINGS - RESUBMIT	<input type="checkbox"/>	REJECT

PETER BASSO ASSOCIATES, INC.

ELEC BY JAM DATE 01/18/12

MECH BY MK DATE 01/18/12

T.C. BY DATE

SUBMITTAL PACKAGE 2 of 2

PRODUCT: BALDOR IDLC350 DIESEL GENERATORS

PROJECT NAME: COMPUTER SERVICES CENTER / ELECTRICAL AND HVAC UPGRADE

WSU PROJECT #: 193-15987 – ACCOUNT NO. 7-71394

BY: Scott Proux
Sales Manager
Preventive Maintenance Technologies

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PETER BASSO ASSOCIATES, INC.

ELEC BY JAM DATE 01/09/12

MECH BY PLD DATE 01/09/12

T.C. BY DATE

MECHANICAL REVIEW

ELECTRICAL REVIEW

WARRANTY FOR GENERATORS TO BE ASSIGNED TO ELECTRICAL CONTRACTOR.

GENERATOR SUPPLIER TO COORDINATE DELIVERY OF GENERATORS WITH ELECTRICAL CONTRACTOR.

FINAL PAYMENT FOR GENERATORS WILL BE MADE BY WAYNE STATE UNIVERSITY DIRECTLY TO GENERATOR SUPPLIER AFTER CONSENT FOR PAYMENT HAS BEEN GIVEN BY THE ELECTRICAL CONTRACTOR.



Got Power? Generator Sales, Service & Rental

BILL OF MATERIAL

(2) BALDOR 350 KW DIESEL GENERATORS

Model	Engine Manufacturer	Frequency / Speed (RPM)	Ambient (Min/Max)
IDLC350-3DU	Detroit	60 Hz / 1800	-18 °C / 40 °C
Duty / Alt Temp Rise	Engine Model	Engine Control Voltage (DC)	Elevation
Standby / 105 °C	6063HV35	24	1000 Ft
Genset Agency Approval	Emissions Standard	Fuel Type	Enclosure / Mount Method
UL2200 / CUL	Tier 3 Emergency	Diesel	Enclosed / Skid Mounted
Output Rating (kw/kva)	Full Load Amps	Voltage (L-L/L-N) - Connection	Phase / Power Factor
350 KW / 438 KVA	526A	480/277 - Hi Wye	Three / 0.80

Additional Specifications:

PRODUCT

Emissions Application: EPA Stationary Emergency

ALTERNATOR

Alternator Regulator: MX341-UL

Drip shield: IP22

Alternator Excitation: PMG

Alternator Model Number: HCI434F-311

Alternator Agency Approval: UL1004

ENGINE

Engine Governor Type: Engine Mfr ECU

Oil and Coolant Drains: Yes

Coolant Radiator: Unit mounted

Coolant Heater: 2.5kW 240V 1Ph w/ J-Box

Battery: Standard Starting

Battery Quantity: 2

Battery Type: Group8D Style 12V 1100 CCA Min

Battery Charger: Yes

BC Brand: Stored Energy Systems

BC Battery Type: Lead Acid

BC Output Amps: 10A

BC Input Volts & Hertz: 120/60

CONTROL

Genset Controller: IntelliGen NT Digital Controls (Internet Module, Monitoring Panel)

Controller Voltage Adjustment: Yes

Controller Low Coolant Level: Yes

NFPA110 Level 1 version: Yes

Run Relay: Yes

Louver Relay: Yes

Remote Annunciator: Surface Mounted RA-15

Remote E-Stop: Yes

Remote Genset Display: Yes

Paralleling version: Yes

ENCLOSURE

Enclosure Style: Sound Attenuated (79 dba @ 23')

Enclosure material: Aluminum - Pre Painted

Enclosure color: Baldor Almond - C11

Enclosure Logo: Standard Baldor Logo

Enclosure Hardware Kit: Stainless Steel HW Key-lockG3A

Integrated Vibro Mounts: Included

EXHAUST

Exhaust Attenuation Grade: Critical

Exhaust Mounting Method: Internal mount for enclosure

POWER CONNECTION

Circuit Breaker: 1

1 Circuit Breaker Rating: 100% Electronic Adjustable (1

1 Circuit Breaker Amp: 600A

1 Circuit Breaker Volt Frame: 600

1 Circuit Breaker Pole: 3 Pole

1 Circuit Breaker Mount Loc.: Unit mounted

1 Circuit Breaker Aux Switch: 1 FORM C

1 Circuit Breaker Shunt Trip: Yes

FUEL

Fuel Tank Capacity: 250 Gallons

Fuel Tank Type: Steel Double Wall Day Tank

Fuel Tank Agency Approval: UL-142 / MDEQ

Flex Fuel Lines: UL

UL 2200 RATING SHALL BE FOR ENTIRE PACKAGED UNIT

Yes it is

FLODDED CELL TYPE PER 263213D,2.3,J,4

GROUP 8D 12V 1155 CCA / FLOODED CELL TYPE BATTERIES

COMPLY WITH APPLICABLE STATE AND LOCAL GOVERNMENT NOISE LEVEL 2 PER 63213D,1.5,I

Spec calls out 85 dba or less. I'm not sure what the local code is, but I'm sure we meet it.

COORDINATE FINAL COLOR WITH OWNER PER 263213D,2.12,A

HOSPITAL GRADE/CRITICAL PER 263213D,2.3,H

Almond is our standard color. Please notify PMT before final approval

Hospital Grade Silencer is a Critical Grade Silencer with Baldor

COMPLY WITH UL489 PER 263213D,2.8,A

We are compliant

Engine Primary Filter:	25 Microns
Engine Secondary Filter:	8 Microns
Water Separator On Engine:	Included
Supplemental 30um filt/sep:	Yes
PRODUCT MANUALS	
Copies of Operating Manual:	2
WARRANTY	
Labor Warranty:	3 Year / 1000 Hours
Parts Warranty:	3 Year / 1000 Hours
TESTING	
Standard Test 1.0 PF:	1 hrs
SPECIAL ITEMS	
Paralleling version:	DONGLE, AVRI, and AVR TRANSFORMER

Ratings Range – 60 Hertz Operation

Standby: kW 200 - 350
kVA 200 - 438

Prime: kW 185 - 320
kVA 185 - 400

Baldor generators are available in a variety of power ratings and installation styles to meet the energy needs of the smallest businesses and the largest manufacturing facilities. All generator sets are designed to meet the specifications to ensure the fastest startup and dependable long-term operation. Rely on Baldor generators to provide the clean, quiet and environmentally friendly electrical power when you need it most. Emergency backup, standby, prime power, peak shaving or for any of your day or night electrical power needs, you can count on a dependable Baldor generator to provide the peace of mind and security you desire.

Standby and Prime Power Features

- ✓ Heavy-duty industrial diesel engine that meets the latest EPA emissions levels
- ✓ Brushless synchronous alternators with dynamic balancing and four pole construction
- ✓ Fully featured microprocessor based controller that's easy to use and field programmable for customized installations
- ✓ Generator sets are prototype tested and production tested to ensure easy startup
- ✓ Gen-set accepts rated load in one step
- ✓ Heavy duty construction that's designed for use in prime or standby applications
- ✓ Manufactured in a dedicated and secure ISO-9001 certified facility
- ✓ Generator sets are backed by a world wide network of parts and service centers
- ✓ Optional agency approvals available including UL2200 and NFPA110
- ✓ Optional environmental enclosures available including weather resistant, sound attenuated, containerized, and walk-in models
- ✓ Full range of genset accessories and factory installed options available

Genset Ratings

Genset Model Number	Alternator	Voltage L-N / L-L	Phase	Hertz	150°C Rise Standby Rating		125°C Rise Prime Rating	
					kW / kVA	Amps	kW / kVA	Amps
IDLC350-3D	HCI444E-311	120/208	3	60	325/406	1129	305/381	1059
		(1) 120/240	3	60	325/406	978	305/381	918
		(1) 120/240	1	60	200/200	833	185/185	771
		139/240	3	60	350/438	1054	320/400	963
		220/380	3	60	296/370	563	276/345	525
		277/480	3	60	350/438	527	320/400	482
	HCI444E-17	347/600	3	60	350/438	421	320/400	385
	HCI444F-311	120/208	3	60	350/438	1216	320/400	1112
		(1) 120/240	3	60	350/438	1054	320/400	963
		(1) 120/240	1	60	230/230	958	210/210	875
		139/240	3	60	350/438	1054	320/400	963
		220/380	3	60	344/430	654	320/400	608
		277/480	3	60	350/438	527	320/400	482
	HCI444F-17	347/600	3	60	350/438	421	320/400	385

We changed the Alternator to HCI434F - 105 Degree C Rise

NOTES: (1) Alternator connections have two circuits available for low voltage. Available current in each low voltage circuit is equal to high voltage current listed in table. For ratings and voltages not listed above refer to the Genset Selector. Standby ratings do not have an overload capability but can be used for the duration of the utility failure per ISO-3046, DIN6271 and BS5514. Prime (Unlimited Running Time) ratings are continuous per DIN 6271 and ISO-3046 with 10% overload capacity. Baldor reserves the right to implement specifications or design changes without notice.

Engine Application Data

Engine Specifications

Manufacturer	Detroit Diesel
Engine Model #	6063HV35
Engine Type	4 Cycle, 6 Cylinder
Induction System	Turbocharged, Charge Air Cooled
Displacement, L (in ³)	14 (855)
EPA Emissions Level	Tier 3
HP at Rated Speed BHP (kW _m)	550 (410)
Rated RPM	1800
Bore and Stroke in(mm)	5.24 x 6.61 (133 x 168)
Compression Ratio	16.0:1
Air Filter Type	Dry
Governor Type/Model	DDEC V Electronic
Governor Manufacturer	Detroit Diesel
Freq Reg NL to FL	Isochronous
Freq Reg Steady State	+/- 0.25%

Engine Lubrication System

Oil Pan Capacity gal(L)	8.0 (30.2)
Oil Pan w/Filter	9.5 (35.9)
Oil Filter Quantity	1
Oil Filter Type	Cartridge
Oil Cooler	Water Cooled
Recommended Oil	15W-40
Oil Press psi(kPa)	50 (344.7)

Engine Cooling System

Genset Max Ambient Temp °F(°C)	122 (50)
Engine Coolant Cap qt(L)	24 (22.7)
Engine + Radiator System Cap qt(L)	105 (99.4)
Water Pump Type	Centrifugal
Coolant Flow gpm (Lpm)	96 (363.4)
Heat Rejected to Cooling Water @ Rated kW; Btu/min (kW)	7450 (131)
Heat Rejected to Charge Cooler @ Rated kW; Btu/min (kW)	4900 (86.1)
Max Restriction of Cooling Air inH ₂ O(kPa)	0.5 (0.124)

Engine Exhaust System

Exhaust Manifold Type	Dry
Exhaust Flow @ Rated kW cfm(cmm)	3090 (87)
Exhaust Temp (dry manifold) °F(°C)	963 (503)
Min Back Pressure inH ₂ O(kPa)	0 (0)
Max Back Pressure inH ₂ O(kPa)	40 (10)
Exhaust Outlet Diameter in(mm)	6 (152.4)
Exhaust Outlet Type	O. D. Tube

Engine Electrical System

Charging Alternator Volts dc	24
Charging Alternator Amps	70
Grounding Polarity	Negative
Starter Motor Volts dc	24
Battery Recommendations	
Battery Volts dc	24
Min Cold Cranking Amps	1100
Quantity Required	2

Ventilation Requirements

Cooling Airflow scfm(cmm)	21024 (596)
Combustion Airflow cfm(cmm)	1160 (33)
Heat Rejected to Ambient	
From Engine Btu/min(kW)	5024 (88)
From Alternator Btu/min(kW)	2389 (42)
Recommended Free Area Intake	
Louver Size ft ² (m ²)	45 (4.18)

Engine Fuel System

Recommended Fuel	#2 Diesel
Fuel Line at Engine	
Supply Line Min ID in(mm)	0.5 (13)
Return Line Min ID in(mm)	0.38 (10)
Fuel Pump Type	Engine Driven
Fuel Pump Max Lift ft (m)	6 (2)
Max Flow to Pump gph(Lph)	88.5 (335)
Fuel Filter	
Secondary Filter	8µm
Secondary Water Separator	Included
Primary Filter	25µm
Primary Water Separator	Included

Fuel Consumption – Standby Rating

100% Load gph(Lph)	27.0 (102.2)
75% Load gph(Lph)	22.1 (83.6)
50% Load gph(Lph)	14.6 (55.3)
25% Load gph(Lph)	7.8 (29.5)

Fuel Consumption – Prime Rating

100% Load gph(Lph)	25.3 (95.8)
75% Load gph(Lph)	20.1 (76.1)
50% Load gph(Lph)	13.2 (50.0)
25% Load gph(Lph)	7.1 (26.9)

Engine Output Deratings - Standby

Rated Temp	77°F
Rated Altitude	500 ft
Max Altitude	6,000 ft
Temperature Derate	-1% / 10°F
Altitude Derate	-1% / 1000 ft

Alternator Specifications

Alternator Type	4-Pole, Rotating Field	Automatic Voltage Regulator	
Exciter Type	Brushless	PMG	Std MX341, Opt MX321
Excitation System	PMG	Voltage Regulation	No Load to Full Load
Insulation	per NEMA MG1	PMG Regulator	+/- 1%, +/- 0.5%
Material	Class H	Load Acceptance	100% of Rating,
Standby Temp Rise	150°C		One Step
Prime Temp Rise	125°C	Subtransient Reactance	
Lead Connection	12 Lead, Reconnectable	480V, Per Unit	12%
Stator Pitch	2/3	TIF (1960 Weighting)	<50
Amortisseur Winding	Full	Line Harmonics	5% Maximum
Bearing	Single, Double Shielded	Motor Starting kVA	30% Max Voltage Dip
Drive Coupling	Flexible Disk	Alt @ 480V SkVA	HCI444E-311 - 1040
Unbalanced Load	20% of Standby Rating	Alt @ 480V SkVA	HCI444F-311 - 1260

Genset Controller Specifications

Baldor IntelliLite NT Features

Large back-lit graphical LCD Display
64x128 pixel resolution

6 LED Genset Status Indicators

Alarm	Red LED
Not In Auto	Red LED
Warning	Yellow LED
Running	Green LED
Ready / Auto	Green LED
Supplying Load	Green LED

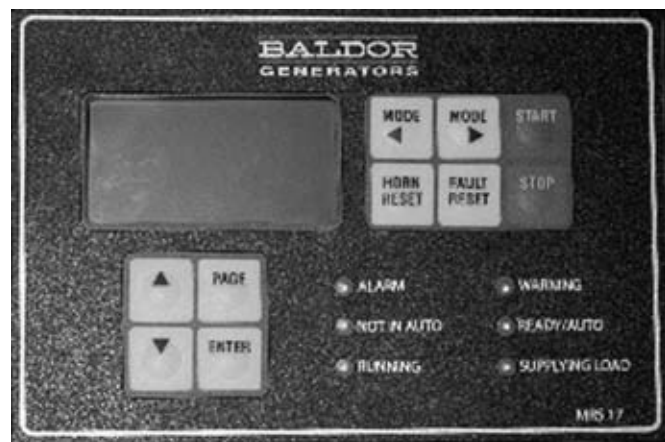
Sealed Membrane Panel to IP65

Push Buttons for Simple Control

Start, Stop, Fault Reset, Horn Reset, Mode,
Page, and Enter Keys

Display Metering and Protection

Oil Pressure Warning / Shutdown
High/Low Coolant Temperature Warning
High Coolant Temperature Shutdown
Low Coolant Level Shutdown
Low Fuel Level Warning / Shutdown
Over Speed Protection
Battery Voltage Under/Over Warning
Running Hour Meter
Generator Under/Over Volts Warn/Shutdown
Generator Under/Over Freq Warn/Shutdown
Generator Over Current Shutdown
Generator Output Metering for V1-V3, I1-I3,
Hz, kW, kWh, kVAr, kVAh



NFPA110 Compliance

An optional Remote Annunciator is available
to meet NFPA110 applications

Remote Annunciator Features – RA15

15 LED Indicators with Function Labels
Horn Reset and Lamp Test keys
CAN Bus Connection for up to 600 Feet



Additional Standard Genset Features

- ✓ Formed Steel Sub-Base
- ✓ Integral Vibration Isolation
- ✓ Sub-Base Lifting Eyes
- ✓ Unit Mounted Radiator
- ✓ Engine Mounted Fan
- ✓ Radiator Core and Fan Guards
- ✓ Battery Charging Alternator
- ✓ Battery Rack and Cables
- ✓ Unit Mounted Control Panel
- ✓ Spin-On Filters for Oil and Fuel
- ✓ Enamel Finish
- ✓ One Set - Operation / Maintenance Manual
- ✓ Factory Tested Prior to Shipment
- ✓ Limited Warranty

These options are included

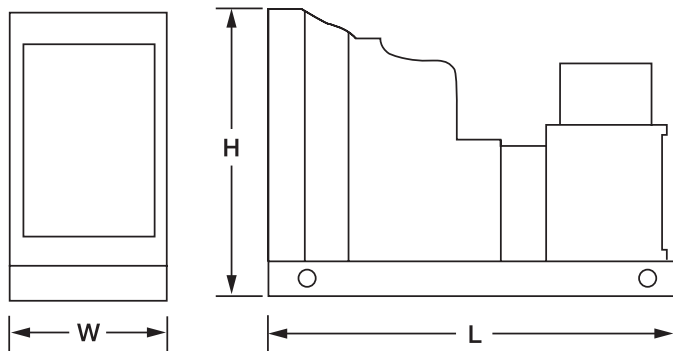
Optional Agency Approvals

- ☐ UL2200 (Review Option Availability)
- ☐ NFPA110 (Request Remote Annunciator)

Weight and Dimensions (Open Unit)

Weight – Wet lb(kg)	7449 (2895)
Overall Dimensions	Length x Width x Height
inches	137 x 60 x 75
mm	3480 x 1524 x 1905

Note: Drawing is provided for reference only. Use engineering outline for installation planning



Available Accessories and Options

Open Unit

- ☐ Industrial Silencer
- ☐ Residential Silencer
- ☐ Critical Silencer
- ☐ Super Critical Silencer
- ☐ Exhaust Flex Pipe
- ☐ Rain Cap
- ☐ Radiator Duct Flange

Enclosed Units

- ☐ Weather Resistant Enclosure
- ☐ Sound Attenuated w/Internal Critical Silencer
- ☐ ISO Container
- ☐ Walk-In Enclosure

Alternator Accessories

- ☐ PMG Exciter and AVR Upgrade
- ☐ Alternator Space Heater
- ☐ Exciter Field Circuit Breaker
- ☐ Alternator Drip Shield

Genset Accessories

- ☐ Voltage Adjust Potentiometer
- ☐ Starting Battery
- Battery Charger ☐ Auto/Float
- Auto/Float Equalize Timer ☐ Manual ☐ Automatic
- ☐ Battery Heater
- ☐ Engine Coolant Heater
- ☐ Oil & Coolant Drain Valves (Engine/Radiator)
- ☐ Oil & Coolant Drain Extended to Base
- Main Output Breaker ☐ Wall Mount ☐ Unit Mount
- Transfer Switch ☐ Manual ☐ Automatic

Control Panel

- ☐ Remote Annunciator
- ☐ Remote Communications
- ☐ Remote E-Stop

Fuel System and Sub-Base Fuel Tank

- Sub-Base Tank ☐ Single Wall ☐ Double Wall
- ☐ UL142 Double Wall with Containment
- Tank Run Time @ 100% Load
- ☐ 12-16 Hours ☐ 24-36 Hours

- ☐ Flex Fuel Line
- ☐ Primary Fuel / Water Separator

Vibration Isolators

- Location ☐ Under Tank ☐ Between Tank
- ☐ Elastomer Isolator ☐ Pad Isolator
- ☐ Standard Spring ☐ Spring for Seismic Zone 4

BALDOR
GENERATORS
WORLD HEADQUARTERS

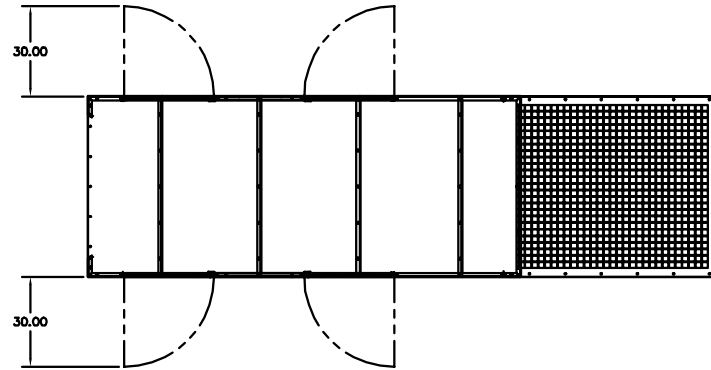
Baldor Electric Company • P. O. Box 2400 • Fort Smith, AR 72902-2400 U.S.A.
 Phone (479) 646-4711 • Fax (479) 648-5792 • International Fax (479) 648-5895

www.baldor.com

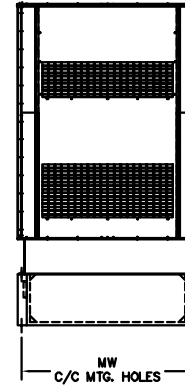
BALDOR GENERATORS

GENERAL INSTALLATION FOR IDLC GENERATORS

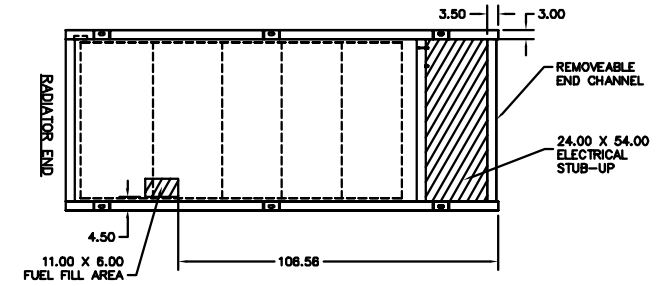
UL2200 MODEL #	MODEL #	OVERALL LENGTH L	OVERALL WIDTH W	OVERALL HEIGHT H	HOOD LENGTH HL	MOUNTING HOLE 1 M1	MOUNTING HOLE 2 M2	MOUNTING HOLE 3 M3	MOUNTING WIDTH MW	TANK HEIGHT TH (12-17 HRS)	TANK HEIGHT TH (24-34 HRS)
IDLC300-3JU	IDLC300-3J	191	60	90	54	12.00	68.50	125.00	57.50	17	31
IDLC300-3DU	IDLC300-3D									21	38
IDLC350-3DU	IDLC350-3D										
IDLC350-3JU	IDLC350-3J	204	60	90	60	12.00	68.50	125.00	57.50	21	38
IDLC400-3DU	IDLC400-3D									21	38
IDLC450-3DU	IDLC450-3D										
IDLC500-2DU	IDLC500-2D										



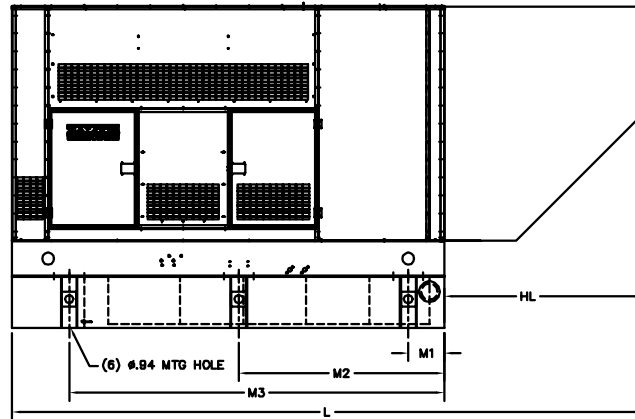
PLAN VIEW



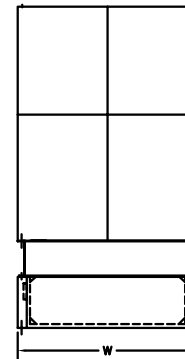
REAR VIEW



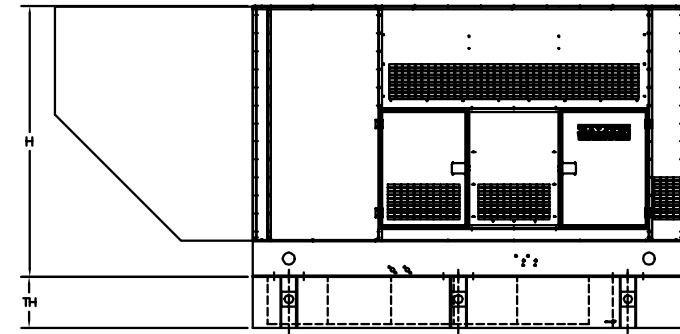
PLAN VIEW OF TANK ONLY



RIGHT SIDE VIEW



FRONT VIEW



LEFT SIDE VIEW

NOTES:

FOR PRODUCT DATA REFER TO
BALDOR MODEL SPEC SHEETS

FOR INSTALLATION RECOMMENDATIONS
REFER TO GEN SET MANUAL MN2407

ALL DIMENSIONS IN INCHES

DRAWING TO SCALE

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMALS .XX ±.25 FRACTIONS ±1/4

CUSTOMER IS RESPONSIBLE FOR DETERMINING THAT BALDOR'S PRODUCT WILL PERFORM SUITABLY IN THE INTENDED APPLICATION.

REV. DESC: REVISE DWG SA-IS-30-150 STUB-UP	VERSION: 05	TDR: 000000521786
REV. LTR: E	REVISED: 02:39:36 12/18/2009	BY: PGCONBO
FILE: \PGA\00010\468		
MTL: -	TAB: SA_IS_300_500	

BALDOR • DODGE • RELIANCE

IDLC 30-500-07E

SH 5 of 12

Standard/Basic	Basic Attenuation	Sound Attenuated HPE Level One Specification Available Upon Request	Sound Attenuated HPE Level Two Specification Available Upon Request	Sound Attenuated HPE Level Three Specification Available Upon Request
<p><i>Applicable to all models above 250 kW</i></p> <ul style="list-style-type: none"> 14 gauge steel ASTM A569, #4 finish Optional 0.080, 5052 Aluminum Modular construction – full flexibility Powder paint system Weather Resistant drip proof construction Heavy duty door gaskets 2 or 4 side access doors Heavy duty latch assembly Heavy duty lockable handle Heavy duty stainless steel hinge with brass pin Pre-hung door assemblies Fixed intake louvers Structural base Radiator cap access Rain gutter over all doors and openings <p><i>Applicable to all models 20 - 250 kW Same as above except following:</i></p> <ul style="list-style-type: none"> Doors are lift-off not hinged Standard duty latch assembly Punched intake screen Formed steel base Mounting to Gen-set 	<p><i>Applicable to all models above 250 kW</i></p> <ul style="list-style-type: none"> 14 gauge steel ASTM A569, #4 finish Optional 0.080, 5052 Aluminum Interior walls lined with acoustical foam Modular construction-full flexibility Powder paint system Weather Resistant drip proof construction Heavy duty door gaskets 2 or 4 side access doors Heavy duty latch assembly Heavy duty lockable handle Heavy duty stainless steel hinge with brass pin Fixed intake louvers Structural base Radiator cap access External radiator discharge hood with screen Rain gutter over all doors and openings <p><i>Applicable to all models 20 - 250 kW Same as above except following:</i></p> <ul style="list-style-type: none"> Doors are lift-off not hinged Standard duty latch assembly Punched intake screen Formed steel base Mounting to Gen-set 	<p><i>Applicable to all models above 900 kW</i></p> <ul style="list-style-type: none"> 15 dbA noise reduction at 3 meters 14 gauge steel ASTM A569, #4 finish Optional 0.080, 5052 Aluminum Modular construction-full flexibility Powder paint system Weather Resistant drip proof construction Heavy duty door gaskets 2 or 4 side access doors Heavy duty latch assembly Heavy duty lockable handle Heavy duty stainless steel hinge with brass pin Pre-hung door assemblies Sound deadening interior wall construction Interior surfaces lined with perforated mill finish aluminum Acoustic Intake louvers-fixed, aluminum Internal discharge hood Radiator cap access Mounting to frame or tank Exhaust system required – not included ** Rain gutter over all doors and openings 3" Wall construction Isolators required - not included Shipping supports – Field adjustable <p><i>Applicable to all models 30 - 825 kW Same as above except following:</i></p> <ul style="list-style-type: none"> External radiator discharge hood with screen 	<p><i>Applicable to all models above 500 kW</i></p> <ul style="list-style-type: none"> 25 dbA noise reduction at 3 meters 14 gauge steel ASTM A569, #4 finish Optional 0.080, 5052 Aluminum Modular construction-full flexibility Powder paint system Weather Resistant drip proof construction Heavy duty door gaskets 2 or 4 side access doors Heavy duty latch assembly Heavy duty lockable handle Heavy duty stainless steel hinge with brass pin Pre-hung door assemblies Sound deadening interior wall construction Acoustic composite barrier material Interior surfaces lined with perforated mill finish aluminum Insulated Intake air hoods Acoustic Intake louvers-fixed, aluminum Internal discharge hood Radiator cap access Mounting to frame or tank Exhaust system required – not included ** Rain gutter over all doors and openings 3" Wall construction Isolators required - not included Shipping supports – Field adjustable <p><i>Applicable to all models 30 - 450 kW Same as above except following:</i></p> <ul style="list-style-type: none"> External Insulated radiator discharge hood with screen 	<p><i>Applicable to all models</i></p> <ul style="list-style-type: none"> 40 dbA noise reduction at 3 meters 14 gauge steel ASTM A569, #4 finish Optional 0.080, 5052 Aluminum Modular construction-full flexibility Powder paint system Weather Resistant drip proof construction Heavy duty door gaskets 2 or 4 side access doors Heavy duty latch assembly Heavy duty lockable handle Heavy duty stainless steel hinge with brass pin Pre-hung door assemblies Fixed intake louvers Radiator cap access Mounting to frame or tank 6" Wall construction Sound deadening interior wall construction Acoustic composite barrier material Interior surfaces lined with perforated mill finish aluminum Intake air attenuator Interior vertical discharge with attenuator. Exhaust system required – not included ** Rain gutter over all doors and openings Isolators required - not included Shipping supports – Field adjustable
<p>* Internally mounted silencer may affect ambient performance and enclosure dimensions</p>	<p>* Internally mounted silencer may affect ambient performance and enclosure dimensions</p> <p>** Basic noise reduction dbA level not available</p>	<p>* Internally mounted silencer may affect ambient performance and enclosure dimensions</p> <p>** Must be Critical Grade at minimum</p>	<p>* Internally mounted silencer may affect ambient performance and enclosure dimensions</p> <p>** Must be Critical Grade at minimum</p>	<p>* Internally mounted silencer may affect ambient performance and enclosure dimensions</p> <p>** Must be Super Critical Grade at minimum</p>

Paint Specification - applicable to all Enclosures

(Detailed paint specification follows on page 2 of Appendix F)

Powder Paint System consisting of the following:

1. Three stage wash system with Phosphate treatment
2. Application of sealant
3. Electrostatically applied enamel based powder paint 1.5 to 2.5 mil thickness
4. Baked at 400o for 15 mintues
5. Almond is our standard color
(other colors available see pricing schedule for cost)

Almond is our standard color. Please notify PMT before final approval

COORDINATE FINAL COLOR WITH OWNER PER 263213D,2.12,A

Insulation Specification

(applicable to Level 1, 2 & 3 only)

Sound Deadening Material specifications:

1. Material is an inorganic glass fiber pre-formed into boards and bonded by a thermosetting resin
2. Density of materials is a 3.0 PCF (48 kg/cm3)
3. Thickness of materials is 3" on Level 1 & 2 Enclosures. Thickness of materials is 6" on Level 3 Enclosures
4. Surface burning characteristics meet the requirements of NFPA 90A & 90B
5. Moisture absorption: (ASTM C553) less than 5% by weight when exposed to air at 120°F (49°C) and 95% humidity for 96 hours
6. Shrinkage: (ASTM C356) will exhibit less than 0.3% linear shrinkage

These specifications are subject to change without notice.

Copyright Baldor Generators.

This information is confidential and proprietary to Baldor Generators

*** PROVIDE ENGINE INFORMATION SIMILAR TO NATURAL GAS SUBMITTAL**

*** PROVIDE EMISSIONS INFORMATION SIMILAR TO NATURAL GAS SUBMITTAL**



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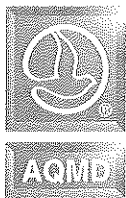
909 Perkins Drive • Mukwonago, WI 53149 • Phone (262) 363-1555 • Fax (262) 363-1556

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Baldor Electric Company • P.O. Box 2400 • Fort Smith, AR 72902-2400 U.S.A.

Phone (479) 646-4711 • Fax (479) 648-5792 • International Fax (479) 648-5895

www.baldor.com



South Coast Air Quality Management District

21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

December 17, 2010

Mr. Frank Seymour
Manager, Compliance and Regulatory Affairs
Detroit Diesel Corporation
13400 W. Outer drive
Detroit, MI 48239-4001

Dear Mr. Seymour,

Attached is the list of Certified Equipment Permits (CEPs) for the Emergency Stationary Internal Combustion Engines. The expiration dates have been extended to December 31, 2011 for these CEPs which reflects the emission standards pursuant to SCAQMD's BACT Guidelines.

Please note that the District does not endorse or warrant any specific equipment or manufacturer. Modification of the equipment listed here will void this certification.

Please contact me if you have any questions concerning this list.

Very truly yours,

A handwritten signature in black ink, reading 'Raman C. Patel', is written over the typed name.

Raman C. Patel, P.E.
Senior Air Quality Engineer
Area Sources/PRDAS
(909) 396-2466
rpatel@aqmd.gov



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DETROIT DIESEL

EMERGENCY STATIONARY ICEs CERTIFIED BY SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

(December 17, 2010)

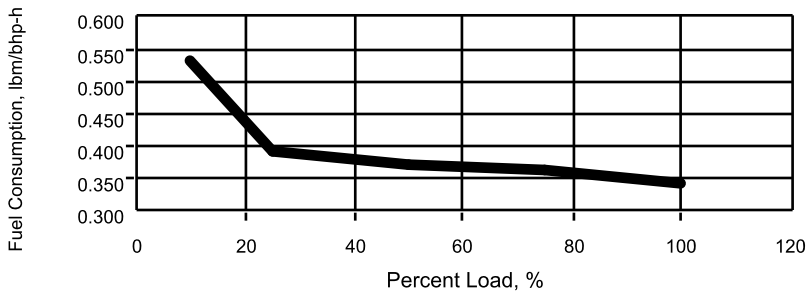
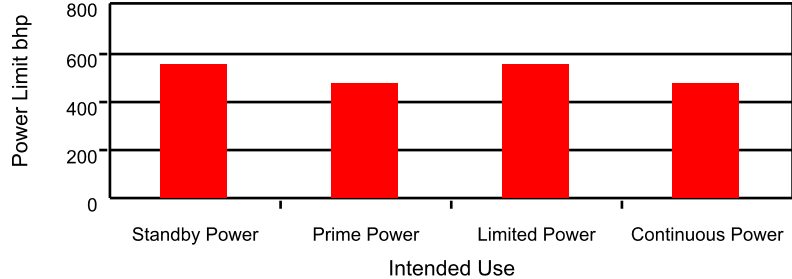
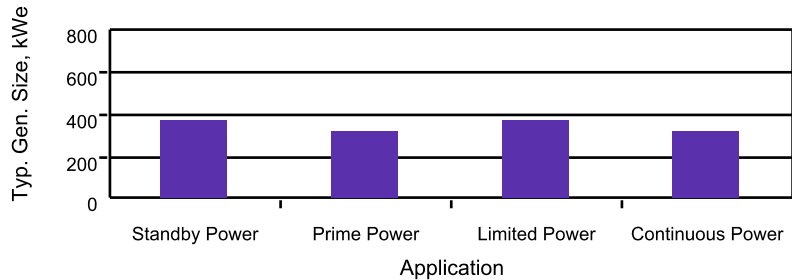
Engine Model	Rating (BHP)	Rating (KW)	Appl. No. (CEP#)	Exp. Date	Comments	HC	NOx	CO	PM
						gms/BHP-Hr			
6063-HV35	415	310	439133	12/31/2011	TIER 3	0.15	2.59	0.64	0.093
6063-HV35	455	339	439136	12/31/2011	TIER 3	0.13	2.6	0.57	0.082
6063-HV35	490	366	439137	12/31/2011	TIER 3	0.11	2.63	0.56	0.087
6063-HV35	550	410	439138	12/31/2011	TIER 3	0.13	2.49	0.87	0.143
6063-HV35	635	474	439139	12/31/2011	TIER 3	0.12	2.54	0.98	0.133
6063-HV35	685	511	439140	12/31/2011	TIER 3	0.08	2.72	0.8	0.134

This is the certification information for the Detroit Diesel Engine.
The certificate meets EPA guidelines based on manufactured date of engine. We will be utilizing the 2011 engine indicated above.



Gen Set Series 60 (14.0 L) - 6063HV35 550 bhp @ 1800 r/min

Performance Data
06N04M8145



Standby Power 60 Hz - 370 kW _e		
Percent Load, %	Power, bhp	Fuel Consumption, lbm/bhp-h
10	55	0.532
25	138	0.394
50	275	0.370
75	413	0.362
100	550	0.343

Limited Power 60 Hz - 370 kW _e		
Percent Load, %	Power, bhp	Fuel Consumption, lbm/bhp-h
10	55	0.532
25	138	0.394
50	275	0.370
75	413	0.362
100	550	0.343

Tolerance for power values shown is +2/-0% at the conditions listed.

Tolerance for fuel values shown has not been specified.

Prime Power 60 Hz - 320 kW _e		
Percent Load, %	Power, bhp	Fuel Consumption, lbm/bhp-h
10	48	0.551
25	119	0.409
50	239	0.381
75	358	0.372
100	477	0.360
110	525	0.361

Continuous Power 60 Hz - 320 kW _e		
Percent Load, %	Power, bhp	Fuel Consumption, lbm/bhp-h
10	48	0.551
25	119	0.409
50	238	0.381
75	356	0.372
100	475	0.360

Condition	SAE J1995
Air Inlet Temp.	77 °F
Total Baro. Pressure	30 in. Hg
Dry Baro. Pressure	29 in. Hg
Fuel Inlet Temp.	100 °F
Spec. Fuel Gravity	0.8376
[ref. temp.]	100 °F
Air Inlet Restriction	10 in. H ₂ O
Exhaust Back Pressure	15 in. H ₂ O
Min. Fuel Heat Content	20,500 Btu/lbm
[ref. test spec]	-
Air Density	0.1 lb/ft ³
Fuel Density	6.99 lb/gal (US)
Oil Density	7.50 lb/gal (US)

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.



Gen Set Series 60 (14.0 L) - 6063HV35 550 bhp @ 1800 r/min

Technical Data
06N04M8145

	Standby Power 60 Hz - 370 kW _e	Prime Power 60 Hz - 320 kW _e	Limited Power 60 Hz - 370 kW _e	Continuous Power 60 Hz - 320 kW _e	
Calibration Details					
Control System	DDEC V Electronics	DDEC V Electronics	DDEC V Electronics	DDEC V Electronics	-
Maximum Power	550	550	550	550	bhp
Maximum Power Speed	1800	1800	1800	1800	r/min
Rated Power Limit	550	477	550	475	bhp
Rated Power Limit Speed	1800	1800	1800	1800	r/min
Typical Low Idle Speed	-	-	-	-	r/min
Typical High Idle Speed	-	-	-	-	r/min
Intended Use	Standby Power applications	Prime Power applications	Limited Run Time Power applications	Continuous Power applications	-
Cooling System					
Coolant Capacity in Engine Circuit	24	24	24	24	qt (US)
Coolant Flow Rate in Engine Circuit	96	96	96	96	gal/min (US)
Heat Rejection to Engine Coolant Circuit	7450	7150	7450	7150	Btu/min
Heat Rejection to Air in Charge Air Circuit	4900	4700	4900	4700	Btu/min
Radiated Heat Rejection	3950	3950	3950	3950	Btu/min
Exhaust System					
Exhaust Flow Rate (volumetric)	3090	2832	3090	2832	ft ³ /min
Exhaust Temperature	963	908	963	908	°F
Fuel System					
Injector Device	EUI N3	EUI N3	EUI N3	EUI N3	-
Injection System	EUI	EUI	EUI	EUI	-
Injector Timing Height	-	-	-	-	mm
Fuel Flow Rate (mass)	-	-	-	-	lb _m /h
Fuel Flow Rate (volumetric)	-	-	-	-	gal/h (US)
Fuel Spill Rate (mass)	-	-	-	-	lb _m /h
Fuel Spill Rate (volumetric)	-	-	-	-	gal/h (US)
Fuel Consumption (mass)	188.5	171.5	188.5	170.8	lb _m /h
Fuel Consumption (volumetric)	27.0	24.5	27.0	24.4	gal/h (US)
Heat Rejection to Fuel	150	-	150	-	Btu/min
Intake System					
Engine Air Flow Rate (volumetric)	1160	1108	1160	1108	ft ³ /min
Intake Manifold Pressure	62	54	62	54	in. Hg
Turbocharger Compressor Outlet Temp.	362	342	362	342	°F

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.



Gen Set Series 60 (14.0 L) - 6063HV35 550 bhp @ 1800 r/min

Technical Data
06N04M8145

	Standby Power 60 Hz - 370 kW _e	Prime Power 60 Hz - 320 kW _e	Limited Power 60 Hz - 370 kW _e	Continuous Power 60 Hz - 320 kW _e	
Lubrication System					
Oil Flow Rate	-	-	-	-	gal/min (US)
Oil Pressure	-	-	-	-	lbf/in. ²
Oil Consumption (mass)	0.19	0.17	0.19	0.17	lb _m /h
Oil Consumption (volumetric)	0.10	0.09	0.10	0.09	qt/h (US)
Additional Information					
Altitude Capability	-	-	-	-	ft
Brake Mean Effective Pressure (BMEP)	283	246	283	245	lbf/in. ²
Compression Ratio	16.0	16.0	16.0	16.0	: 1
Friction Horsepower	-	-	-	-	fhp
Mean Piston Speed	1984	1984	1984	1984	ft/min
Turbocharger	GT55, Wastegated	GT55, Wastegated	GT55, Wastegated	GT55, Wastegated	-

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.



Gen Set Series 60 (14.0 L)

550 bhp @ 1800 r/min

Installation Data
6063HV35

Cooling System

Min. Coolant Flow Rate in Engine Circuit	86.4 gal/min (US)
Max. Coolant Out Temp. in Engine Circuit	210 °F
Max. Engine Water Pump Discharge Pressure (Exclusive of Pressure Cap)	- lbf/in. ²
Min. Water Pump Inlet Pressure (Rapid Warm-up Rad.)	0.0 lbf/in. ²
Min. Water Pump Inlet Pressure (Conventional Rad.)	0.0 lbf/in. ²
Max. Water Pump Static Pressure Head	21.7 lbf/in. ²
Max. External Restriction in Engine Circuit	5.3 lbf/in. ²
Min. Engine Coolant Fill Rate	3.0 gal/min (US)
Min. Drawdown	10 %
Max. Dearation Time	30 min
Min. Pressure Cap	9.0 lbf/in. ²
Max. System Pressure (Exclusive of Pressure Cap)	7.8 lbf/in. ²
Min. Top Tank Coolant Temp.	160 °F

Crankshaft System

Max. Radial Load- Crankshaft	- lbf
Max. Continuous Load- Thrust Bearing	900 lbf
Max. Intermittent Load- Thrust Bearing	1800 lbf
Max. Shock Load- Thrust Bearing	- lbf
Max. Vertical Load at Rear Face of Flywheel (†)	2001 lbf
Max. Static Bending Moment at Rear Face of Block	1000 ft-lbf

(†) The weight of the flywheel must be included with the OEM components.

Electrical System

Max. Resistance of Starting Circuit - 12 V System	0.0012 Ω
Max. Resistance of Starting Circuit - 24 V System	0.002 Ω
Rec. Battery Capacity - 12 V System	1875 CCA
Rec. Battery Capacity - 24 V System	950 CCA

Exhaust System

Max. Exhaust System Back Pressure	3.0 in. Hg
Rec. Dry Exhaust Pipe Dia. - Single	5.0 in.
Rec. Dry Exhaust Pipe Dia. - Dual	4.0 in.

Fuel System

Max. Fuel Inlet Temp.	140 °F
Max. Fuel Pump Suction for Clean System	6.0 in. Hg
Max. Fuel Pump Suction for Dirty System	12.2 in. Hg
Rec. Primary Fuel Filter Size	25 micron
Max. Secondary Fuel Filter Size	5 micron

Intake System

Max. Ambient to Intake Manifold Temp. Differential	45 °F
Max. Ambient to Turbo Compressor Inlet Temp. Rise	30 °F
Max. CAC System Total Pressure Drop	4 in. Hg
Max. Crankcase Pressure	3 in. H ₂ O
Max. Intake Manifold Pressure	- in. Hg
Max. Intake Manifold Temp.	151 °F
Max. Intake Restriction for a Clean Air Cleaner	12 in. H ₂ O
Max. Intake Restriction for a Dirty Air Cleaner	20 in. H ₂ O
Rec. Intake Pipe Dia. - Single	6.0 in.
Rec. Intake Pipe Dia. - Dual	- in.

Lubrication System

Max. Change in Oil Pressure from Engine Out to Oil Cooler Inlet for Remote-mounted Filters	- in. H ₂ O
--	------------------------



Gen Set Series 60 (14.0 L) - 6063HV35 550 bhp @ 1800 r/min

Emission Data
06N04M8145

Certification Summary

Certification Code (CWC)	5534
US Nonroad (Tier 1)	Not certified.
US Nonroad (Tier 2)	Not certified.
US Nonroad (Tier 3)	Certified.
US Nonroad (Tier 4)	Not certified.
EURO Nonroad (Stage I)	Not certified.
EURO Nonroad (Stage II)	Not certified.
EURO Nonroad (Stage III)	Not certified.
EURO Nonroad (Stage IV)	Not certified.
South Coast Air Quality Management District (SCAQMD)	Certified.

Compliance Summary

Japanese Nonroad	No.
TA-Luft Power Plant	No.
SCAQMD Permit Information	
- Application Number	439138
- Status	Certified.
- Issue Date	01 APR 2005
- Expiration Date	01 APR 2006

Available power is shown. Data does not include parasitic losses from fans, accessories, etc. Parasitic losses will vary depending on the final product configuration and reduce the available power accordingly.

**FUEL REQUIREMENTS BEGINNING OCTOBER 1, 2010
REQUIRES #2 ULTRA LOW SULFUR DIESEL.**

Emission Data

Steady-state Emission Summary

NO _x	- g/h
CO	- g/h
HC	- g/h
SO ₂ - with .5% sulfur content fuel	427 g/h
SO ₂ - with .015 % sulfur content fuel	12.8 g/h
Particulates	- g/h

C1 Cycle Emission Summary

NO _x	- g/bhp·h
CO	- g/bhp·h
HC	- g/bhp·h
Particulates	- g/bhp·h

D2 - Cycle Emissions

Engine Load	10%	25%	50%	75%	100%	Cycle Value g/bhp·h
			g/h			
CO	291	211	172	132	261	0.87
HC	73.3	35.5	19.8	17.8	12.5	0.13
SO ₂ - with 0.5% sulfur content fuel	66.4	123	231	339	427	-
SO ₂ - with 0.015% sulfur content fuel	1.3	3.2	6.4	9.6	12.8	-
Particulates	10.9	29.0	41.0	28.8	38.8	0.14
NO _x	186	300	474	837	1665	2.49

Opacity Mode

Acceleration	- %
Lug	- %
Peak	- %
Smoke	
Bosch No.	0.4
@ Peak Torque Speed (- -)	-

Emission levels of the engine may vary as a function of ambient temperature, barometric pressure, humidity, fuel type and quality, installation parameters, measuring instrumentation, etc. The data provided are laboratory results from one engine representing this rating. The data was obtained under controlled environmental conditions with calibrated instrumentation traceable to the United States National Bureau of Standards and in compliance with US EPA regulations found at 40 CFR Part 89 (Control of Emissions From New and In-Use Nonroad Compression-Ignition Engines). The weighted cycle value from each engine is guaranteed to be below the US EPA Standards at the US EPA defined conditions.



Gen Set
Series 60 (14.0 L) - 6063HV35
550 bhp @ 1800 r/min

Noise Summary
06N04M8145

Frequency, Hz	Surface, dB(A)	Exhaust, dB(A)	Structureborne Longitudinal, dB(A)	Structureborne Transverse, dB(A)	Structureborne Vertical, dB(A)
40	-	-	-	-	-
80	62.0	-	-	-	-
100	71.0	-	-	-	-
125	75.0	-	-	-	-
160	83.0	-	-	-	-
200	80.0	-	-	-	-
250	79.0	-	-	-	-
315	83.0	-	-	-	-
400	85.0	-	-	-	-
500	87.0	-	-	-	-
630	91.0	-	-	-	-
800	96.0	-	-	-	-
1000	98.0	-	-	-	-
1250	95.0	-	-	-	-
1600	96.0	-	-	-	-
2000	96.0	-	-	-	-
2500	95.0	-	-	-	-
3150	94.0	-	-	-	-
4000	89.0	-	-	-	-
5000	86.0	-	-	-	-
6300	84.0	-	-	-	-
8000	88.0	-	-	-	-
10,000	76.0	-	-	-	-
12,500	73.0	-	-	-	-
16,000	71.0	-	-	-	-
20,000	-	-	-	-	-
Total	105.2	-	-	-	-

Conditions and Tolerances

Data Tolerance	Tolerance for values shown has not been specified.	Tolerance for values shown has not been specified.	Tolerance for values shown has not been specified.	Tolerance for values shown has not been specified.	Tolerance for values shown has not been specified.
Test Standard	not specified	not specified	not specified	not specified	not specified
Comments	not specified	not specified	not specified	not specified	not specified



Gen Set Series 60 (14.0 L)

Mechanical Data 6063HV35

Camshaft	
UPC Group Number	06X01B6099
Type	Gear-driven
Location	In the cylinder head
Material	Bar stock (SAE 1513)
Surface Finish - Journal	Ground finish
Surface Finish - Lobe	Injector & Exhaust: Thielenhaus honed, Intake: Ground finish
Camshaft Bearing	
Type	Two-piece design
Material	Trimetal (Steel backed bronze with lead overlay)
Mean Effective Length [MEL]	1.486 in.
Mean Journal Diameter [MJD]	2.559 in.
Projected Area [per bearing]	3.80 in. ²
Connecting Rod	
Type	"I"-section
Material	Forged, steel alloy - SAE 4140
Connecting Rod Cap	
Type	-
Material	-
Connecting Rod Crank Pin Bearing	
Type	Precision, half-shell design
Quantity [per journal]	2
Material - Lower Bearing	Trimetal (steel-backed, bronze, and lead overlay)
Material - Upper Bearing	Trimetal (steel-backed, bronze, and lead overlay)
Mean Effective Length [MEL]	1.705 in.
Mean Journal Diameter [MJD]	3.346 in.
Projected Area [per bearing]	5.70 in. ²

Crankshaft	
Type	One-piece
Material	Forged, steel alloy - SAE 1548
Surface Finish - Journal	Induction hardened
Type of Balance	Dynamic
Crankshaft Main Bearing	
Type	Precision, half-shell design
Quantity [per journal]	2
Material - Lower Bearing	Trimetal (steel-backed, bronze, and lead overlay)
Material - Upper Bearing	Trimetal (steel-backed, bronze, and lead overlay)
Mean Effective Length [MEL]	1.547 in.
Mean Journal Diameter [MJD]	4.921 in.
Projected Area [per bearing]	7.61 in. ²
Crankshaft Thrust Bearing	
Type	-
Quantity	-
Mean Effective Length [MEL]	- in.
Mean Journal Diameter [MJD]	- in.
Projected Area [per bearing]	- in. ²
Cylinder Block	
UPC Group Number	06A01 6043
Type	Inline cylinder block
Material	Cast iron
Cylinder Head	
UPC Group Number	06A02 6034
Type	One-piece slab, 4 valves per cylinder
Material	Cast iron
Air Management	Cross-flow
Cylinder Liner	
UPC Group Number	06A01 6043
Type	Wet, replaceable liner
Material	Cast iron



Gen Set Series 60 (14.0 L)

Mechanical Data 6063HV35

Exhaust Valve

Type	Poppet valve with rotator
Material - Head	Nickel-based
Material - Stem	Chrome-plated
Operating Mechanism	Overhead camshaft with rocker arm
Type of Lifter	Roller follower
Quantity [valves per cylinder]	2
Quantity [springs per valve]	1

Exhaust Valve Insert

Type	Replaceable design
Material	Nickel-based - GM3550

Intake Valve

Type	Poppet valve with rotator
Material - Head	Iron-based
Material - Stem	Chrome-plated
Operating Mechanism	Overhead camshaft with rocker arm
Type of Lifter	Roller follower
Quantity [valves per cylinder]	2
Quantity [springs per valve]	1

Intake Valve Insert

Type	Replaceable design
Material	Iron-based - GM76135

Piston

Type	Cross-head design
Material - Crown	Steel
Material - Skirt	Aluminum
Cooling	Oil- cocktail shaker

Piston Pin

Type	Polished and hardened
Material	-
Wrist Pin Keepers	-

Piston Pin Bearing

Type	One-piece bushing
Material	Bronze - solid

Piston Ring, Compression

Top Ring	Keystone - chrome, barrel face design
Second Ring	Keystone - chrome, barrel-tapered face design
Quantity [per piston]	-

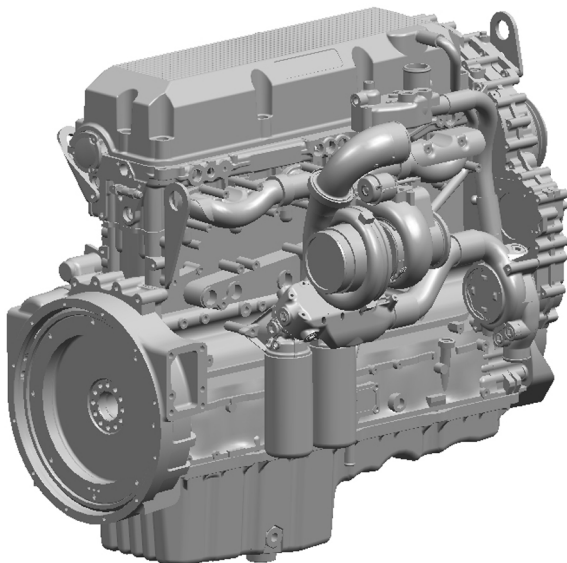
Piston Ring, Oil

Type	Double rail with expander, conformable
Quantity [per piston]	1
Location	Bottom of piston dome



Gen Set Series 60 (14.0 L) - 6063HV35

Engine Configuration Data Summary



Description

Model Number	6063HV35
Number of Cylinders	6
Bore	5.24 in.
Stroke	6.61 in.
Displacement - per cylinder	142 in. ³
Displacement - total	855 in. ³
Aftertreatment	No Aftertreatment Device
Aspiration	Turbocharged
Combustion System	Direct Injection
Charge Air Cooling System	Air-to-Air Charge Cooling
Electronic System	DDEC V Electronics
Engine Type	Inline Engine
Ventilation	Open Engine Crankcase
Status	Available
Availability Date	01 JAN 2005
Discontinued Date	-

This model is approved for commercial gen set applications that can be operated at either 50 or 60 Hz.

Size

Overall Length	57.20 in.
Overall Width	39.63 in.
Overall Height	50.07 in.

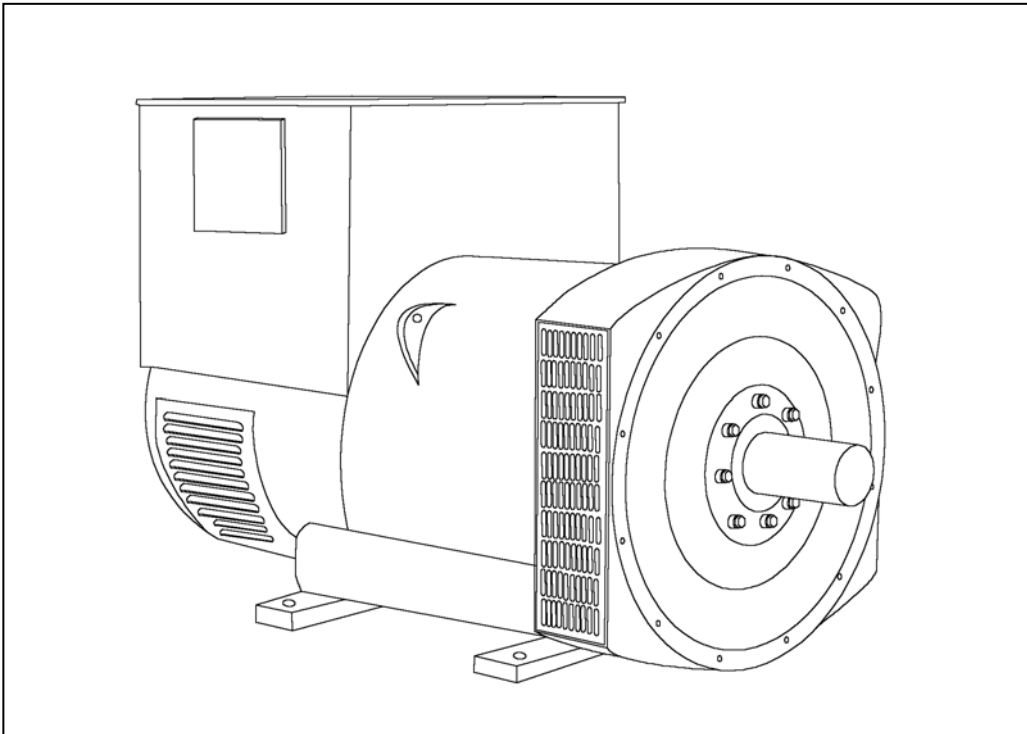
Weight

Approximate Dry Weight	2551 lb _m
Approximate Wet Weight	2679 lb _m

Center of Gravity for a Dry Engine

Distance from Rear Face of Block: x-axis	22.30 in.
Distance above Crankshaft: y-axis	7.52 in.
Distance to the Right of the Crankshaft: z-axis	1.32 in.

HCI 434F/444F - Technical Data Sheet



HCI434F/444F

SPECIFICATIONS & OPTIONS



STANDARDS

Newage Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359. Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX440 AVR - STANDARD

With this self-excited system the main stator provides power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.

The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.

The SX440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

If 3-phase sensing is required with the self-excited system, the SX421 AVR must be used.

SX421 AVR

This AVR also operates in a self-excited system. It combines all the features of the SX440 with, additionally, three-phase rms sensing for improved regulation and performance. Over voltage protection is provided via a separate circuit breaker. An engine relief load acceptance feature is built in as standard.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.

The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.

An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

If three-phase sensing is required with the PMG system the MX321 AVR must be used.

We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.

Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.

All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

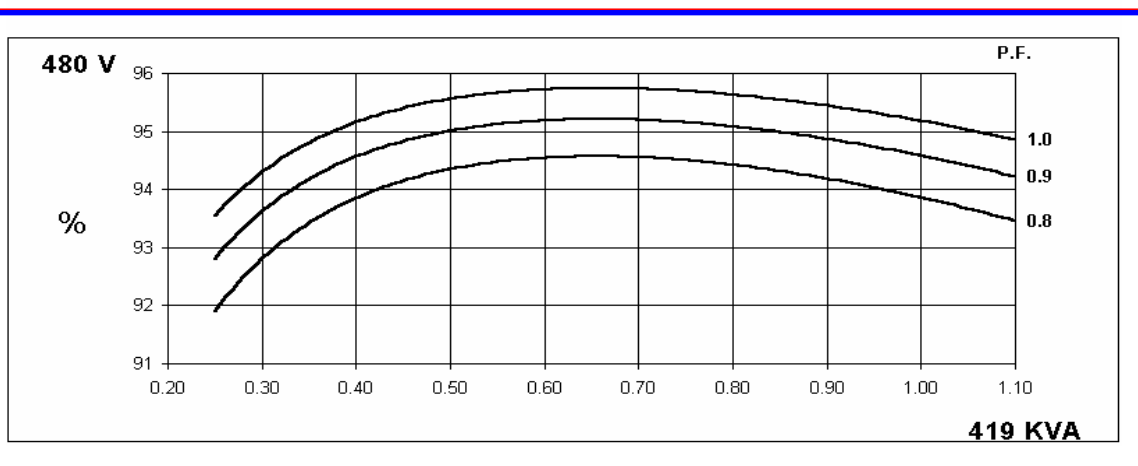
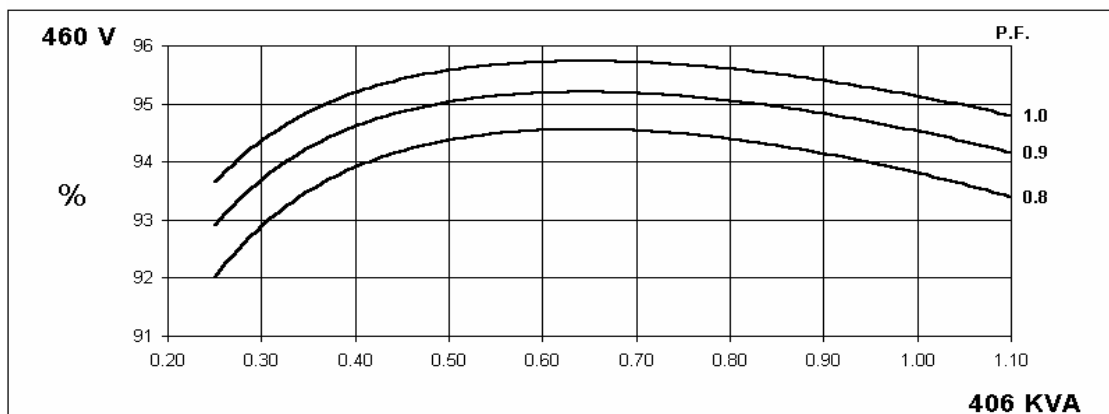
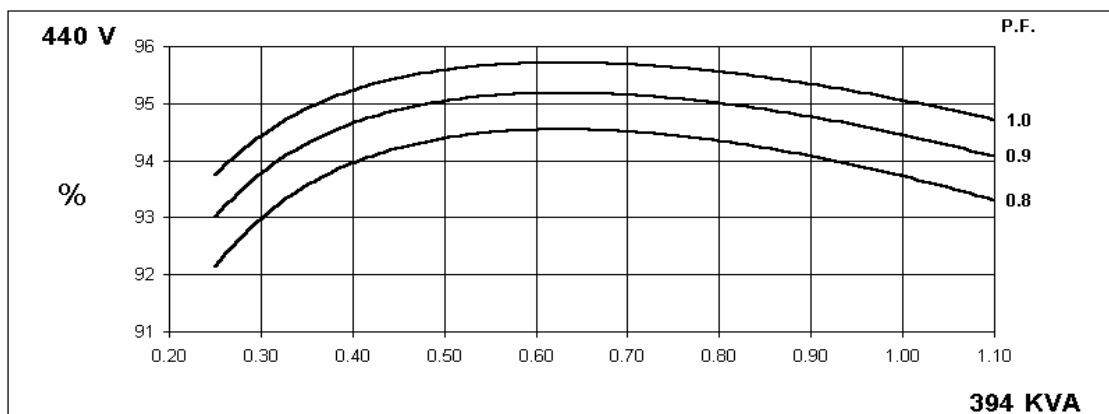
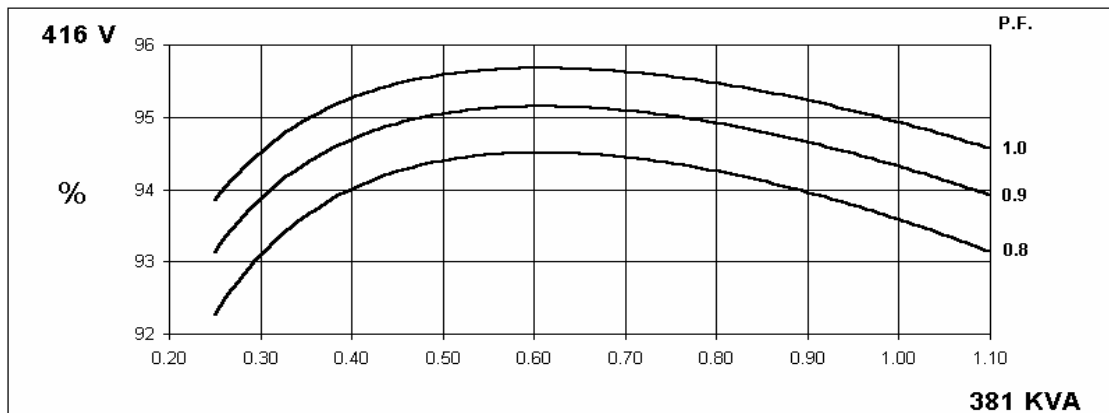
Front cover drawing typical of product range.

HCI434F/444F

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.							
A.V.R.	MX321	MX341						
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING					
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)							
CONTROL SYSTEM	SELF EXCITED							
A.V.R.	SX440	SX421						
VOLTAGE REGULATION	± 1.0 %	± 0.5 %	With 4% ENGINE GOVERNING					
SUSTAINED SHORT CIRCUIT	WILL NOT SUSTAIN A SHORT CIRCUIT							
INSULATION SYSTEM	CLASS H							
PROTECTION	IP23							
RATED POWER FACTOR	0.8							
STATOR WINDING	DOUBLE LAYER LAP							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	12							
STATOR WDG. RESISTANCE	0.0073 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.37 Ohms at 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6317 (ISO)							
BEARING NON-DRIVE END	BALL. 6314 (ISO)							
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	1160 kg				1160 kg			
WEIGHT WOUND STATOR	535 kg				535 kg			
WEIGHT WOUND ROTOR	463 kg				440 kg			
WR² INERTIA	5.4292 kgm²				5.2304 kgm²			
SHIPPING WEIGHTS in a crate	1775 kg				1780 kg			
PACKING CRATE SIZE	155 x 87 x 107(cm)				156 x 87 x 107(cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.486 m³/sec 1030 cfm				0.580 m³/sec 1240 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
KVA BASE RATING FOR REACTANCE VALUES	380	380	380	380	444	456	463	475
Xd DIR. AXIS SYNCHRONOUS	2.59	2.34	2.17	1.93	3.21	2.95	2.74	2.58
X'd DIR. AXIS TRANSIENT	0.17	0.15	0.14	0.12	0.18	0.17	0.15	0.14
X''d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	0.09	0.13	0.12	0.11	0.10
Xq QUAD. AXIS REACTANCE	2.23	2.01	1.87	1.66	2.84	2.61	2.42	2.28
X''q QUAD. AXIS SUBTRANSIENT	0.30	0.27	0.25	0.22	0.42	0.39	0.36	0.34
Xl LEAKAGE REACTANCE	0.06	0.05	0.05	0.04	0.07	0.06	0.06	0.06
X2 NEGATIVE SEQUENCE	0.21	0.19	0.18	0.16	0.28	0.26	0.24	0.22
X0 ZERO SEQUENCE	0.08	0.08	0.07	0.06	0.10	0.09	0.09	0.08
REACTANCES ARE SATURATED			VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED					
T'd TRANSIENT TIME CONST.	0.08s							
T''d SUB-TRANSTIME CONST.	0.019s							
T'do O.C. FIELD TIME CONST.	1.7s							
Ta ARMATURE TIME CONST.	0.018s							
SHORT CIRCUIT RATIO	1/Xd							

THREE PHASE EFFICIENCY CURVES



HCI434F/444F

Winding 311

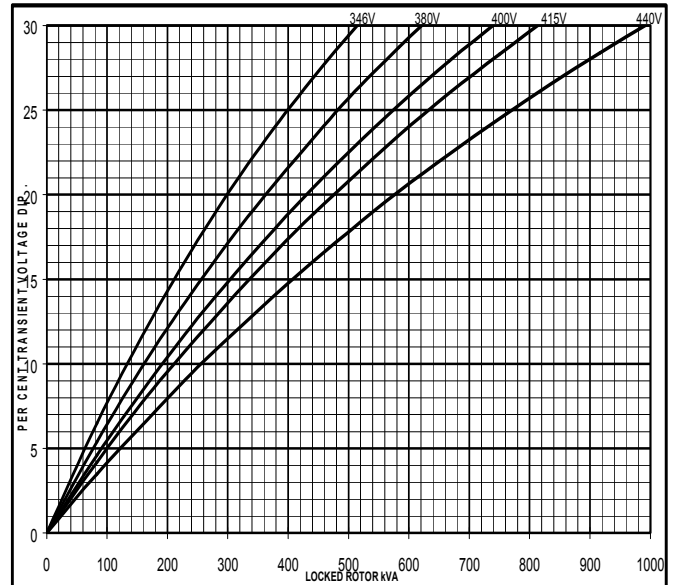


Locked Rotor Motor Starting Curve

**50
Hz**

MX

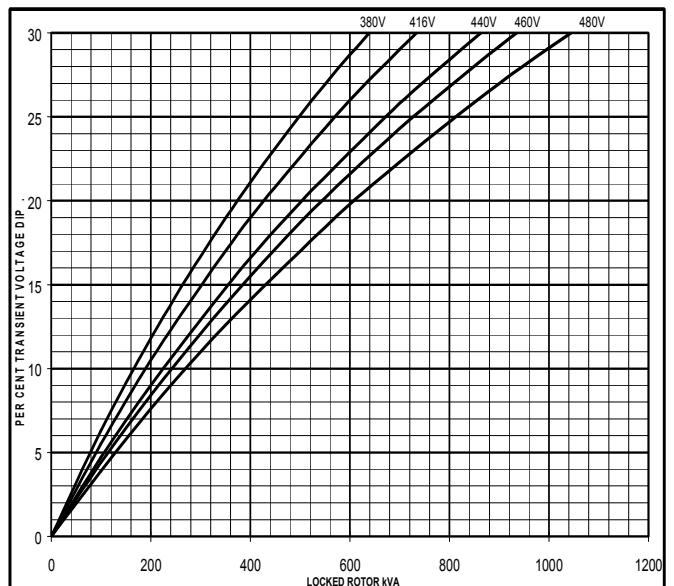
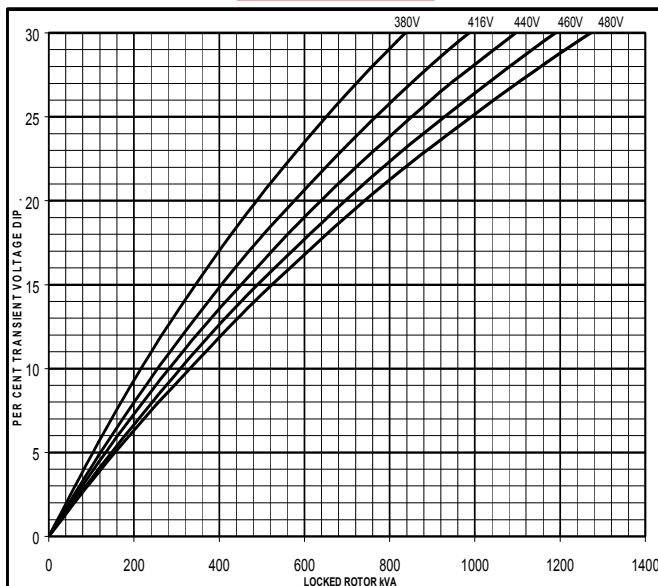
SX



**60
Hz**

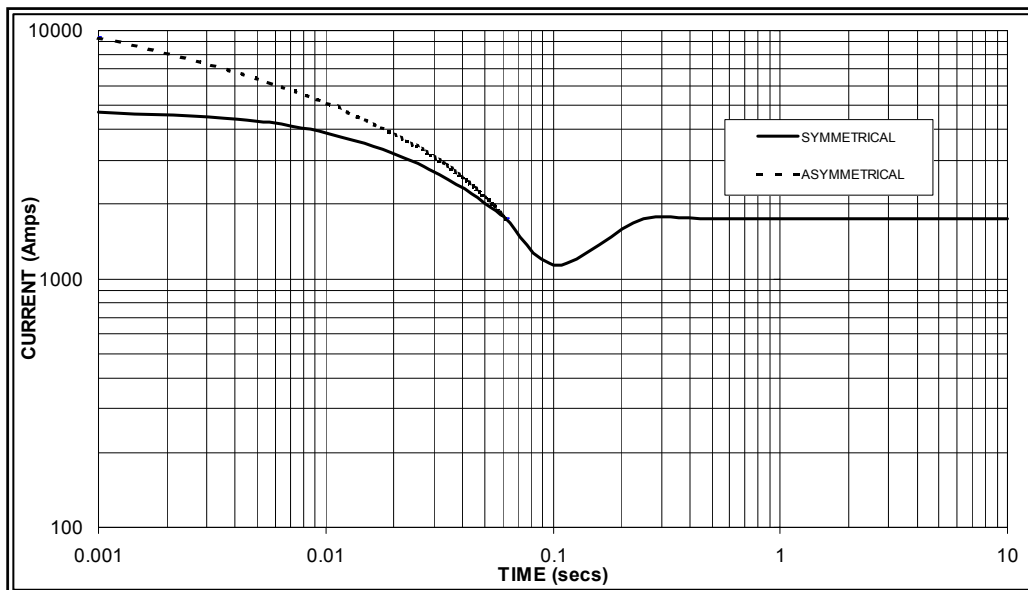
MX

SX



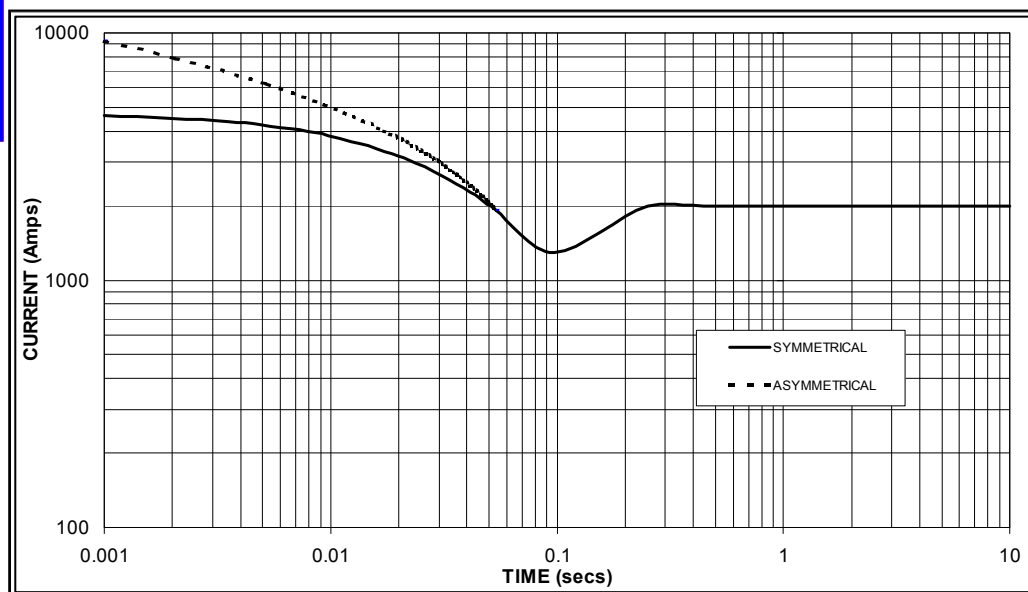
**Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on star (wye) connection.**

**50
Hz**



Sustained Short Circuit = 1,750 Amps

**60
Hz**



Sustained Short Circuit = 2,000 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.05	440v	X 1.06
415v	X 1.09	460v	X 1.10
440v	X 1.16	480v	X 1.15

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

PROVIDE TEMPERATURE RISE OF 105 DEGREE C STAND-BY RATING
PER SPECIFICATION SECTION 26 3213D, 2.9, D.

Continuous Duty is rated for an extended outage and Standby is rated for a day or two outage. So the Continuous duty is a better rating.

HCI434F/444F

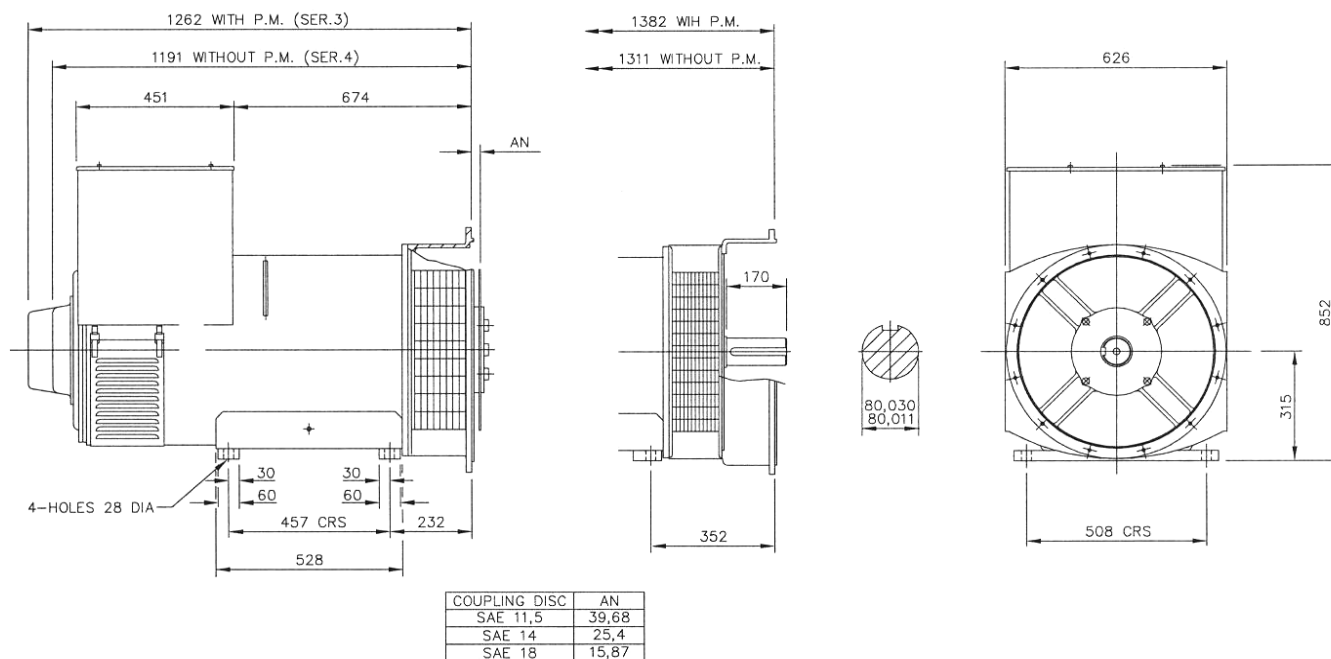
Winding 311 / 0.8 Power Factor



RATINGS

Class - Temp Rise		Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	350	350	350	350	380	380	380	380	390	390	390	390	404	404	404	404
	kW	280	280	280	280	304	304	304	304	312	312	312	312	323	323	323	323
	Efficiency (%)	93.8	94.0	94.1	94.2	93.4	93.7	93.8	94.0	93.3	93.5	93.7	93.9	93.1	93.4	93.5	93.7
	kW Input	299	298	298	297	325	324	324	323	334	334	333	332	347	346	346	345
60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	405	420	425	438	444	456	463	475	475	483	488	500	488	500	506	519
	kW	324	336	340	350	355	365	370	380	380	386	390	400	390	400	405	415
	Efficiency (%)	93.9	94.0	94.1	94.1	93.5	93.7	93.8	93.9	93.2	93.4	93.6	93.7	93.0	93.2	93.4	93.5
	kW Input	345	357	361	372	380	389	395	405	408	414	417	427	420	429	433	444

DIMENSIONS



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Industrial Tank Heaters

(Conduit Connection)

1500 - 5000 watt

Weathertight

Single Phase



CB Model without thermostat.



CB Model assembled with thermostat.



CL Model without thermostat.



CL Model assembled with thermostat.



Ambient Above -20° F	Ambient Below -20° F	Model Number without Thermostat	Model Number with Thermostat (see chart 1)	Volts	Watts	Phase	Amps	Fig.* No.
350 — 500 Cubic Inch or Less	200 — 300 Cubic Inch or Less	CB115100-000	CB1151XX-000	120	1500	1	12.5	1
		CB115800-000	CB1158XX-000	208	1500	1	7.2	1
		CB115200-000	CB1152XX-000	240	1500	1	6.3	1
		CB115700-000	CB1157XX-000	277	1500	1	5.4	1
		CB115300-000	CB1153XX-000	380	1500	1	3.9	1
		CB115400-000	CB1154XX-000	480	1500	1	3.1	1
500 — 600 Cubic Inch or Less	300 — 400 Cubic Inch or Less	CB120100-000	CB1201XX-000	120	2000	1	16.7	1
		CB120800-000	CB1208XX-000	208	2000	1	9.6	1
		CB120200-000	CB1202XX-000	240	2000	1	8.3	1
		CB120300-000	CB1203XX-000	380	2000	1	5.3	1
600 — 800 Cubic Inch or Less	400 — 500 Cubic Inch or Less	CB120400-000	CB1204XX-000	480	2000	1	4.2	1
		CB125100-000	CB1251XX-000	120	2500	1	20.8	1
		CB125800-000	CB1258XX-000	208	2500	1	12.0	1
		CB125200-000	CB1252XX-000	240	2500	1	10.4	1
		CB125700-000	CB1257XX-000	277	2500	1	9.0	1
		CB125300-000	CB1253XX-000	380	2500	1	6.6	1
800 — 1000 Cubic Inch or Less	500 — 600 Cubic Inch or Less	CB125400-000	CB1254XX-000	480	2500	1	5.2	1
		CL130100-100	CL1301XX-100	120	3000	1	25.0	3
		CL130800-100	CL1308XX-100	208	3000	1	14.4	3
		CL130200-100	CL1302XX-100	240	3000	1	12.5	3
		CL130700-100	CL1307XX-100	277	3000	1	10.8	3
		CL130300-100	CL1303XX-100	380	3000	1	7.9	3
1000 — 1350 Cubic Inch or Less	600 — 800 Cubic Inch or Less	CL130400-100	CL1304XX-100	480	3000	1	6.3	3
		CL140800-100	CL1408XX-100	208	4000	1	19.2	3
		CL140200-100	CL1402XX-100	240	4000	1	16.7	3
		CL140700-100	CL1407XX-100	277	4000	1	14.4	3
		CL140300-100	CL1403XX-100	380	4000	1	10.5	3
		CL140400-100	CL1404XX-100	480	4000	1	8.3	3
1350 — 1650 Cubic Inch or Less	800 — 1000 Cubic Inch or Less	CL150800-100	CL1508XX-100	208	5000	1	24.0	3
		CL150200-100	CL1502XX-100	240	5000	1	20.8	3
		CL150700-100	CL1507XX-100	277	5000	1	18.1	3
		CL150300-100	CL1503XX-100	380	5000	1	13.2	3
		CL150400-100	CL1504XX-100	480	5000	1	10.4	3

*Figure Number refers to technical drawings of heaters located on page 14.

INSTALLATION TIPS

If you require a 1" NPT female thread on the thermostat intake, a coupler is available. Also, for the use of 3/4" or 1" ID heater hose, hose barb adapters are available. See below.

Part Number	Description
HB-1	1" NPT to 1" hose barb adapter. Installs in 1" NPT female inlet or outlet of the heater.
HB-3/4	1" NPT to 3/4" hose barb adapter. Installs in 1" NPT female inlet or outlet of the heater.
HB-C	1" NPT x 1" NPT aluminum coupler. Installs on 1" NPT inlet to T-Stat and allows the addition of HB-1 or HB-3/4.
HB-K3/4	Kit contains (2) HB-3/4 and (1) HB-C
HB-K1	Kit contains (2) HB-1 and (1) HB-C

CHART 1

HEATERS WITH THERMOSTATS

To specify temperature range of thermostat, insert numerical code from chart in place of the XX in model number.

Example:

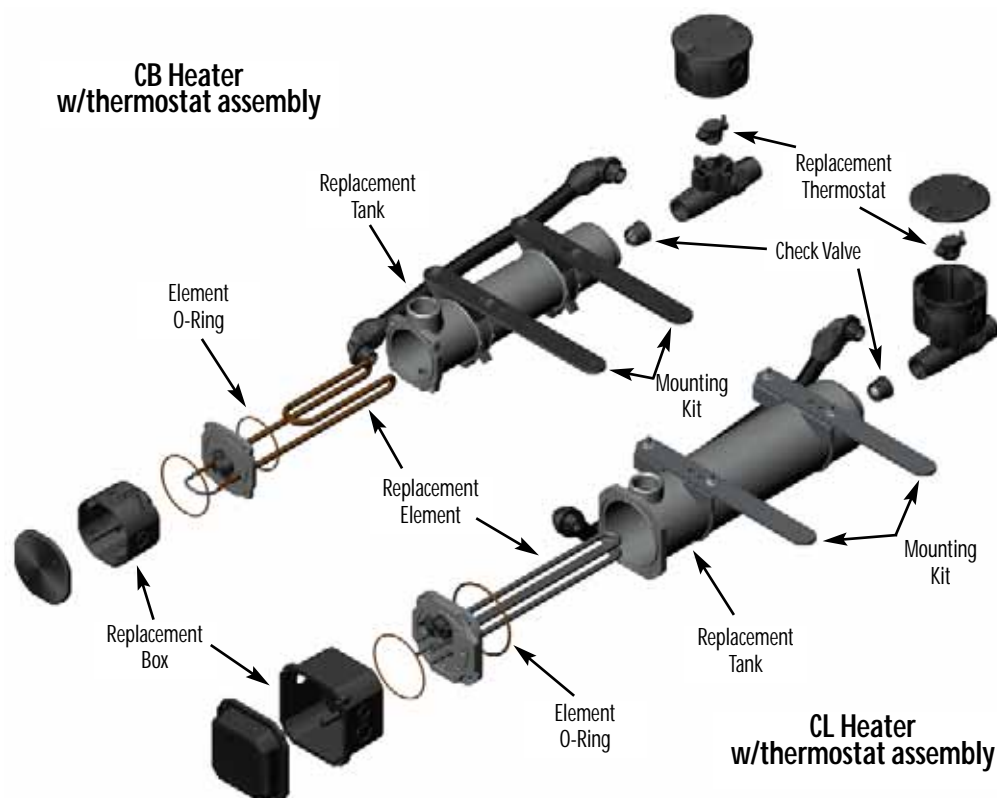
Desired Temperature Range 100° - 120°F
Catalog Number: Model CB1151XX-000
Order as: Model CB115110-000

All heaters over 277v and all 3Ø units must use a control box	TEMPERATURE RANGE		NUMERICAL CODE
	ON	OFF	
See Control Systems page 38	60°F	80°F	06
	80°F	100°F	08
	100°F	120°F	10
	120°F	140°F	12
	140°F	160°F	14
	Adjustable 90° - 130°F		A3




Replacement Parts

For tank-style heaters shown on page 8

Model Number	Volts	Watts	Replaceable Parts					
			Element	Tank	Box	Element O-ring	Mounting Kit	Check Valve
CB115100-000	120	1500	RECB1151	RTB	RTBCB	TMM-OR	FK2	RV-M
CB115800-000	208	1500	RECB1158	RTB	RTBCB	TMM-OR	FK2	RV-M
CB115200-000	240	1500	RECB1152	RTB	RTBCB	TMM-OR	FK2	RV-M
CB115700-000	277	1500	RECB1157	RTB	RTBCB	TMM-OR	FK2	RV-M
CB115300-000	380	1500	RECB1153	RTB	RTBCB	TMM-OR	FK2	RV-M
CB115400-000	480	1500	RECB1154	RTB	RTBCB	TMM-OR	FK2	RV-M
CB120100-000	120	2000	RECB1201	RTB	RTBCB	TMM-OR	FK2	RV-M
CB120800-000	208	2000	RECB1208	RTB	RTBCB	TMM-OR	FK2	RV-M
CB120200-000	240	2000	RECB1202	RTB	RTBCB	TMM-OR	FK2	RV-M
CB120300-000	380	2000	RECB1203	RTB	RTBCB	TMM-OR	FK2	RV-M
CB120400-000	480	2000	RECB1204	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125100-000	120	2500	RECB1251	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125800-000	208	2500	RECB1258	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125200-000	240	2500	RECB1252	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125700-000	277	2500	RECB1257	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125300-000	380	2500	RECB1253	RTB	RTBCB	TMM-OR	FK2	RV-M
CB125400-000	480	2500	RECB1254	RTB	RTBCB	TMM-OR	FK2	RV-M
CL130100-100	120	3000	RECL1301-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL130800-100	208	3000	RECL1308-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL130200-100	240	3000	RECL1302-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL130700-100	277	3000	RECL1307-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL130300-100	380	3000	RECL1303-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL130400-100	480	3000	RECL1304-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL140800-100	208	4000	RECL1408-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL140200-100	240	4000	RECL1402-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL140700-100	277	4000	RECL1407-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL140300-100	380	4000	RECL1403-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL140400-100	480	4000	RECL1404-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL150800-100	208	5000	RECL1508-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL150200-100	240	5000	RECL1502-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL150700-100	277	5000	RECL1507-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL150300-100	380	5000	RECL1503-100	RTL	RTBCL-100	TML-OR	FK6	RV-M
CL150400-100	480	5000	RECL1504-100	RTL	RTBCL-100	TML-OR	FK6	RV-M



Heaters with Thermostats		
Temperature Range		Thermostat Replacement
ON	OFF	
60°F	80°F	RSU6
80°F	100°F	RSU8
100°F	120°F	RSU10
120°F	140°F	RSU12
140°F	160°F	RSU14
Adjustable 90° - 130°F		RSU90-130

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-  Too bad all choices can't be this easy.
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EXIDE® HEAVY DUTY SPECIFICATIONS

BCI GROUP SIZE	PART NUMBER	CCA @ 0° F	CCA @ 32° F**	RC MIN @ 25A	LENGTH	OVERALL DIMENSIONS IN INCHES		TERMINAL TYPE
WIDTHHEIGHT								
EXIDE® HEAVY DUTY Commercial Series & Farm Batteries — 12 VOLT								
3EE	F-3EE	370	440	100	19-1/4	4-1/4	8-9/16	A
3ET	F-3ET	460	550	120	19-1/4	4-1/4	9-9/16	A
4D	COM-4D-P	1000	1200	320	19-9/16	8-5/16	10	A
4DLT	F-4DLT	820	970	250	20	8-1/8	8-1/8	A
8D*	COM-8D	1300	1560	435	20-3/4	11	10	A
	COM-8D (312)	1300	1560	435	22-5/16	11	10	*B(312)
	COM-8D (313)	1300	1560	435	22-5/16	11	10	*B(313)
	COM-8D (314)	1300	1560	435	22-5/16	11	10	*B(314)
	COM-8D (316)	1300	1560	435	22-5/16	11	10	*B(316)
	COM-8D-P	1155	1380	400	20-7/8	11	10	A
	COM-8D-P (312)	1155	1380	400	22-5/16	11	10	*B(312)
	COM-8D-P (313)	1155	1380	400	22-5/16	11	10	*B(313)
	COM-8D-P (314)	1155	1380	400	22-5/16	11	10	*B(314)
	COM-8D-P (316)	1155	1380	400	22-5/16	11	10	*B(316)
	COM-8D-PS	1155	1380	400	20-7/8	11	10	T
16TF	F-16TF	545	665	210	16-1/2	7-1/8	11-1/16	A
17TF	F-17TF	530	665	140	17	6-7/8	7-7/8	A
30H	COM-30H	700	850	180	13	6-15/16	9-5/8	A
EXIDE® HEAVY DUTY Commercial Series & Farm Batteries — 6 VOLT								
1	COM-1H-P	625	750	160	8-13/16	6-3/4	8-5/8	A
2	COM-2-P	625	750	150	10-1/4	6-7/8	9-5/16	A
2E	F-2E	615	675	180	19-3/8	4-1/8	9-1/8	A
3EH	F-3EH	850	1020	280	19-1/4	4-1/4	9-7/8	A
4	F-4EC-P	975	1170	300	13	6-3/4	9-1/4	A
4EH	F-4EH	930	1110	300	19-1/4	5	10	A
5D	COM-5D	850	1020	280	13-1/2	7-1/4	9-3/8	A
7D	COM-7D	975	1170	330	15-7/8	7-1/4	9-3/8	A
EXIDE® RoadForce® AGM Batteries — 12 VOLT								
31	XRF-31D	925	1110	200	13	6-5/8	9-7/16	T
	XRF-31E	925	1110	200	13	6-5/8	9-7/16	M (3/8)
	RF-31D	700	840	200	13	6-5/8	9-7/16	T
	RF-31E	700	840	200	13	6-5/8	9-7/16	M (3/8)
EXIDE® Extreme Cycler 200 Group 31 Battery — 12 Volt								
31	EXHC-200D	700	840	200	13	6-13/16	9-5/16	T
EXIDE® Select Performance™ Batteries — 12 Volt								
31	XHP-31D	950	1100	190	13	6-13/16	9-7/16	T
	XHP-31E	950	1100	190	13	6-13/16	9-3/8	A
	HP-31D	925	1050	180	13	6-13/16	9-7/16	T
	HP-31E	925	1050	180	13	6-13/16	9-3/8	A
	HC-31D	700	840	180	13	6-13/16	9-7/16	T
	HC-31E	700	840	180	13	6-13/16	9-3/8	A
EXIDE® HEAVY DUTY Commercial Series Batteries — 12 VOLT								
31	COM-31E	660	800	160	13	6-13/16	9-7/16	T
	COM-31D	660	800	160	13	6-13/16	9-3/8	A

TERMINALS

D=Stud Terminal
E=SAE Terminal

Plan-312 (BCI type B) side/bus terminal with 3/8" negative and positive threaded terminals.
Plan-313 (BCI type B) side/bus terminal with 3/8" negative and 1/2" positive threaded terminals.
Plan-314 (BCI type B1) side/bus terminal with 3/8" negative and positive threaded terminals.
Plan-316 (BCI type B) side/bus terminal with 3/8" negative and positive threaded terminals.



TYPE A



TYPE B



TYPE B-1



TYPE M



TYPE T

* Note special terminal configuration for 8D batteries.
** Note CCA @ 32° F is a reference rating.



Exide uses a comprehensive business approach to recycling called Total Battery Management (TBM)™. TBM includes manufacturing and distribution of lead-acid batteries, collection of spent batteries, reclamation of battery materials and use of those materials in new batteries.

Exide Technologies recycles sufficient lead tonnage to make the Company one of the largest secondary lead recyclers in the world, returning the materials to new product and diverting them from the waste stream. Exide Technologies batteries are recyclable.



For more information and nationwide warranty terms visit us at www.StartPositiveStayPositive.com or call 1-800-START-IT



Start Positive. Stay Positive.™

NRG

Intelligent Engine Start Battery Charger



The Smart Choice for Mission-Critical Engine Starting

- **Fast, accurate, mission-critical charging** – gives best starting reliability
- **Replace nearly any charger** – without planning ahead
- **Industry-first battery-fault alarm** - helps dispatch service early
- **1 million hour observed MTBF** – means longest charger life
- **Smart design** – stops load dump and other damaging transients



NRG Battery Charger Benefits and Features



Failure to start due to battery problems is the leading cause of inoperable engine generator sets.

SENS NRG battery charger maximizes starting system reliability while slashing genset servicing costs:

One NRG replaces almost any charger without extra site visits. Installers can select or change at any time 120, 208 or 240 volts AC input, 12 or 24-volt battery and output settings optimized for nearly any lead-acid or nickel cadmium battery.

Easy to understand user interface provides state-of-the-art system status – including digital metering, NFPA 110 alarms and a battery fault alarm that can send service personnel to the site before failure to start.

Batteries charged by NRG give higher performance and last longer. In uncontrolled environments precision charging by SENS increases battery life and watering intervals 400% or more.

NRG meets all relevant industry standards – including UL, NFPA 110 and CE. All units are either C-UL listed or C-UL recognized. 50/60 Hz units add CE marking to UL agency marks.

EnerGenius reliability technology built into every charger includes:

- All-electronic operation with generous component de-rating
- Disconnected/reversed/incorrect voltage battery alarm and protection
- Protection of connected equipment against load dump transients
- Widest temperature rating, and overtemperature protection
- Superior lightning and voltage transient protection
- Demonstrated field MTBF > 1 million hours
- Standard 3-year warranty and available reimbursement of customer field service costs

Earn the best return on your charger investment – choose SENS NRG

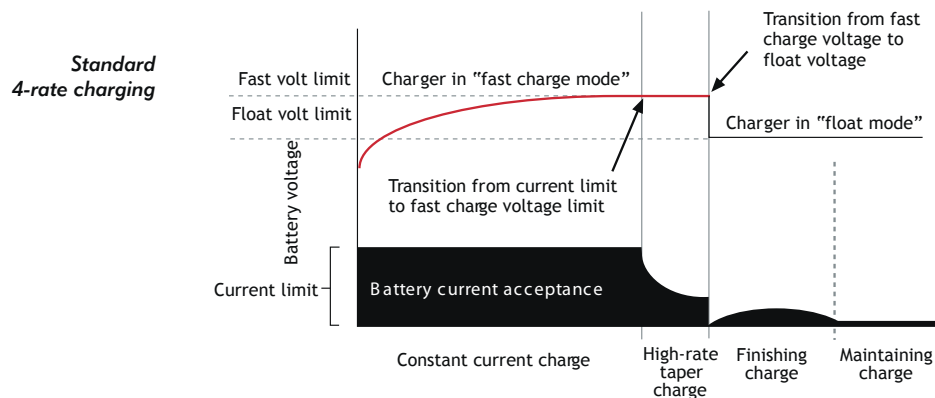
NRG Specifications

AC Input

Voltage	110-120/208-240 VAC, $\pm 10\%$, single phase, switch selectable
Input current	10A charger: 6.6/3.3 amps maximum 20A charger: 12.6/6.3 amps maximum
Frequency	60 Hz $\pm 5\%$ standard; 50/60 Hz $\pm 5\%$ optional
Input protection	1-pole fuse, soft-start, transient suppression

Charger Output

Nominal voltage ratings	12 or 24 volt nominal
Optional voltage rating	12/24 volt, field selectable
Battery settings	Six discrete battery voltage programs - Low or high S.G. flooded - Low or high S.G. VRLA - Nickel cadmium 9, 10, 18, 19 or 20 cells
Regulation	$\pm 0.5\%$ (1/2%) line and load regulation
Current	10 or 20 amps nominal
Electronic current limit	105% rated output typical – no crank disconnect required
Charge characteristic	Constant voltage, current limited, 4-rate automatic equalization
Temperature compensation	Enable or disable anytime, remote sensor optional
Output protection	Current limit, 1-pole fuse, transient suppression



User Interface, Indication and Alarms

Digital meter	Switch-selectable meter for output volts, amps
Accuracy	$\pm 2\%$ volts, $\pm 5\%$ amps
Alarms	LED and Form C contact(s) per table:



Front panel status display

Alarm System Functions

Alarm code "1" ¹		Alarm code "C" ² (meets requirements of NFPA 110)
AC good	LED	LED
Float mode	LED	LED
Fast charge	LED	LED
Temp comp active	LED	LED
AC fail	LED ²	LED and Form C contact
Low battery volts		LED and Form C contact
High battery volts		LED and Form C contact
Charger fail	LED ²	LED and Form C contact
Battery fault ³	LED ²	LED and Form C contact

1. Alarms "1" available only on 10A charger
2. Form C contact provides summary alarm of these conditions. BBHH chargers include this alarm configuration. Contacts rated 2A @ 26 VDC resistive
3. Battery fault alarm indicates these fault conditions:
 - Battery disconnected - Battery polarity reversed - Mismatched charger battery voltage - Open or high resistance charger to battery connection
 - Open battery cell or excessive internal resistance

Controls

AC input voltage select
Optional 12/24-volt output select
Battery program select
Fast charger enable/disable
Temp compensation enable
Remote temp comp enable

Field-selectable switch
Field-selectable two-position jumper
Field-selectable six-position jumper
Field-selectable two-position jumper
Standard. Can be disabled or re-enabled in the field
Connect optional remote sensor to temp comp port



Simple field adjustments

Environmental

Operating temperature
Over temperature protection
Humidity
Vibration (10A unit)
Transient immunity

-20C to +60C, meets full specification to +45C
Gradual current reduction to maintain safe power device temperature
5% to 95%, non-condensing
UL 991 Class B (2G sinusoidal)
ANSI/IEEE C62.41, Cat. B, EN50082-2 heavy industrial

Agency Standards

Safety

Agency marking

EMI
NFPA standards
Optional agency compliance

C-UL listed to UL 1236 (required for UL 2200 gensets), CSA standard 22.2 no. 107.2-M89
CE: 50/60 Hz units DOC to EN 60335
60 Hz: C-UL-US listed
50/60 Hz: C-UL-US listed plus CE marked
FCC Part 15 Class B; EN 50081-2
NFPA 70, NFPA 110. (NFPA 110 requires Alarms "C")
Units with Alarms "1" configuration available with additional compliance to UL category BBHH and NFPA 20

Construction

Housing/configuration

Packaging
Dimensions
Printed circuit card
Cooling
Protection degree
Damage prevention
Electrical connections

Material: Heavy clear anodized aluminum. Configuration options:
• Fully enclosed: C-UL listed enclosure
• Open frame: C-UL recognized
• Slimline: C-UL recognized open frame construction with remote isolation transformer
Open-frame and Slimline configurations only available in bulk OEM quantities and packaging
See Drawings and Dimensions page for details
Surface mount technology, conformal coated
Natural convection
Listed housing: NEMA-1 (IP20). Optional NEMA 3R enclosure
Fully recessed display and controls
Compression terminal blocks

Warranty

Standard warranty
Optional warranty

Three year parts and labor warranty from date of shipment
If specified at time of order, warranty coverage is increased to reimburse customer's documented field service costs up to the original charger price. Contact the factory for full details

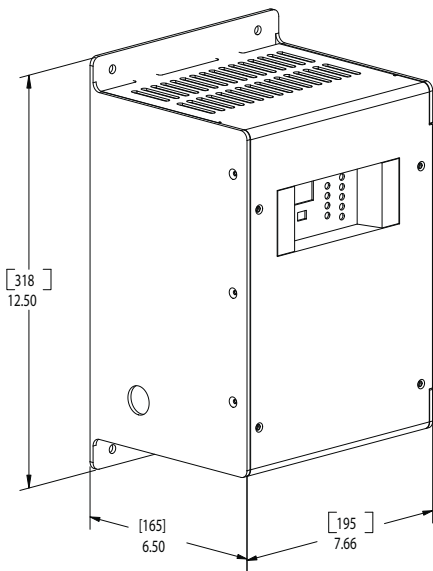
Optional features

Input
Remote temp comp sensor
Drip shield
NEMA 3R housing
UL BBHH listing
Field service warranty

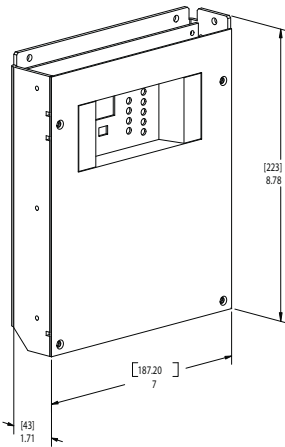
Input frequency, 50/60 Hz
Recommended where battery and charger are in different locations
Protects from dripping water
Enables outdoor installation (remote temp sensor recommended)
Available in 10A units with Alarms "1"
Reimbursement of customer field service expenses up to charger price

Drawings and Dimensions

10A Chargers Enclosed and Open Frame Configurations

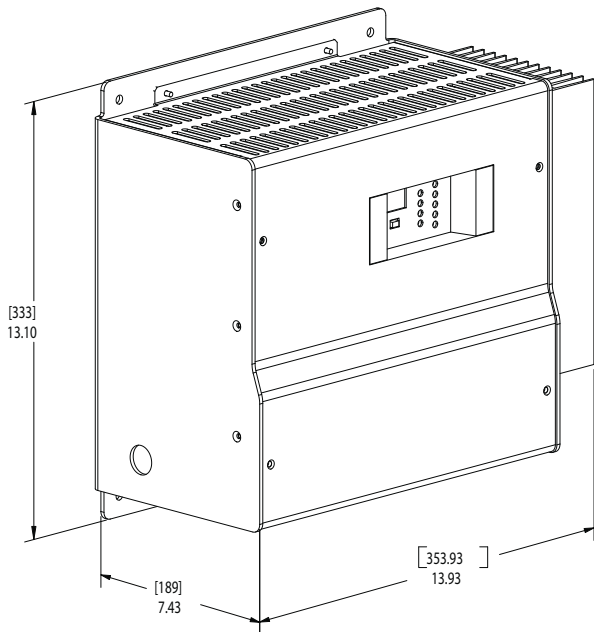


10A Chargers Slimline Open Frame Configuration



Slimline can be mounted either flat or edgewise

Open-frame configuration omits front cover



20A Chargers Enclosed and Open Frame Configurations

Open-frame configuration omits front cover

Housing Dimensions Table

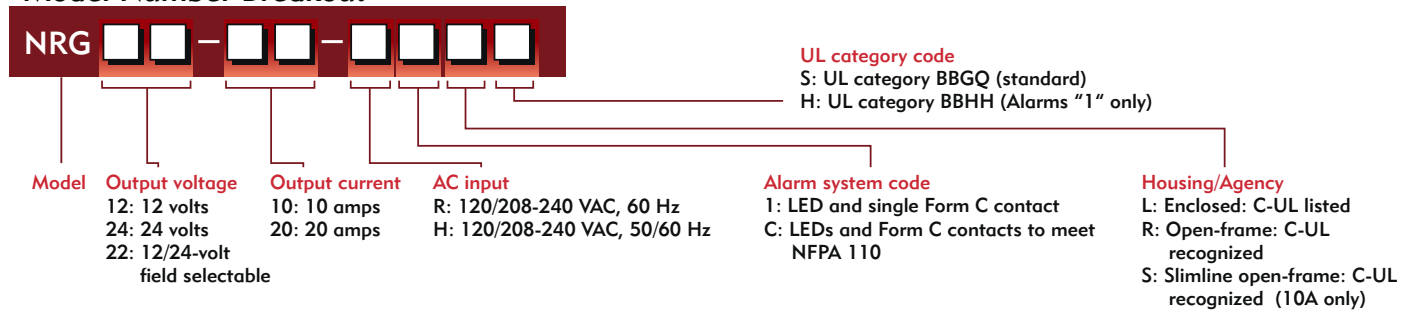
Amps	Configuration	Width	Depth	Height
10	Enclosed	7.66" (195 mm)	6.50" (165 mm)	12.50" (318 mm)
10	Open-frame	7.66" (195 mm)	6.50" (165 mm)	12.50" (318 mm)
10	Slimline – flat mount	7.00" (187 mm)	1.71" (43 mm)	8.78" (223 mm)
10	Slimline – edge mount	1.71" (43 mm)	7.00" (187 mm)	8.78" (223 mm)
20	Enclosed	13.93" (354 mm)	7.43" (189 mm)	13.10" (333 mm)
20	Open-frame	13.93" (354 mm)	7.43" (189 mm)	13.10" (333 mm)

NRG Ordering Information

Output volts	Output amps	Model	Available configurations	NFPA 110 Alarms	Lbs/Kg
12	10	NRG12-10-R1	Enclosed, Open-frame, Slimline	No	19 / 8.7
12	10	NRG12-10-RC	Enclosed, Slimline	Yes	19 / 8.7
24	10	NRG24-10-R1	Enclosed, Open-frame, Slimline	No	24 / 10.9
24	10	NRG24-10-RC	Enclosed, Slimline	Yes	24 / 10.9
12/24	10	NRG22-10-R1	Enclosed, Open-frame, Slimline	No	24 / 10.9
12/24	10	NRG22-10-RC	Enclosed, Slimline	Yes	24 / 10.9
12	20	NRG12-20-RC	Enclosed, Open-frame	Yes	39 / 17.7
24	20	NRG24-20-RC	Enclosed, Open-frame	Yes	42 / 19.1
12/24	20	NRG22-20-RC	Enclosed, Open-frame	Yes	42 / 19.1

All models offer field-selectable input 120/208-240 volts. 60 Hz input is standard with C-UL listing. Optional 50/60 Hz input includes C-UL listing and adds CE mark.

Model Number Breakout



The Smart Choice for Mission-Critical Engine Starting

Additional Information

Contact SENS or your local sales representative for additional specification, engineering and installation information



Contact Information

For information and service on any SENS product, please contact us at:
 Sales 1.866.736.7872 • 303.678.7500 • Fax 303.678.7504
 www.sens-usa.com • info@sens-usa.com
 1840 Industrial Circle, Longmont, CO 80501 USA



InteliGen^{NT}

GENERAL PURPOSE HIGH-END GEN-SET CONTROLLER



GENERATOR MONITORING AND PARALLELING CONTROLS TO
COMPLY WITH 263213D, 2.5 & 2.7

GENERATOR MONITORING TO CONNECT TO SEIMENS BMS

Description

InteliGen^{NT} is a comprehensive controller for both single and multiple gen-sets operating in standby or parallel modes. Compact construction is optimized for these purposes and various HW modifications allow customers to select the optimum type for a particular application.

A built-in synchronizer and digital isochronous load sharer allow a total integrated solution for gen-sets in standby, island parallel or mains parallel. Native cooperation of up to 32 gen-sets is a standard feature.

InteliGen^{NT} supports many standard ECU types and is specially designed to easily integrate new ones.

A powerful graphic display with user-friendly controls allows any user whatever their ability to find the information they need.

ComAp is able to offer customized firmware solutions.

Benefits

- ▷ Support of engines with ECU (Electronic Control Unit)
- ▷ Excellent configurability to match customers' needs exactly
- ▷ Complete integrated gen-set solution and signal sharing via CAN bus – minimum external components needed
- ▷ Many communication options – easy remote supervising and servicing
- ▷ Perfect price/performance ratio
- ▷ Gen-set performance log for easy problem tracing



ComAp is a member of AMPS (The Association of Manufacturers of Power generating Systems).



ComAp products meet the highest standards, with every stage of production undertaken in accordance with the ISO certification obtained in 1998.



Selected ComAp products have the UL Certification.

Features

InteliGen^{NT}

- ▷ Support of engines with ECU (J1939, Modbus and other proprietary interfaces); alarm codes displayed in text form
- ▷ AMF function
- ▷ Automatic synchronizing and power control (via speed governor or ECU)
- ▷ Baseload, Import/Export
- ▷ Peak shaving
- ▷ Voltage and PF control (AVR)
- ▷ Generator measurement: U, I, Hz, kW, kVAr, kVA, PF, kWh, kVAh
- ▷ Mains measurement: U, I, Hz, kW, kVAr, PF
- ▷ Inputs and outputs configurable for various customer needs
- ▷ Controller redundancy
- ▷ RS232/RS485 interface with Modbus support; Analog/GSM/ISDN/CDMA modem support; SMS messages; ECU Modbus interface
- ▷ Event-based history (up to 500 records) with customer-selectable list of stored values; RTC; statistic values
- ▷ Integrated PLC programmable functions
- ▷ Interface to remote display unit (IG-Display LT GC)
- ▷ Dimensions 180 × 120 mm (front panel)
- ▷ Sealed to IP65

InteliGen^{NTC} – All items from InteliGen^{NT} plus:

- ▶ Selectable measurement ranges for AC voltages and currents – 120/277 V, 0–1/0–5 A
- ▶ Secondary isolated RS232/RS485 interface
- ▶ USB 2.0 slave interface

Integrated fixed and configurable protections

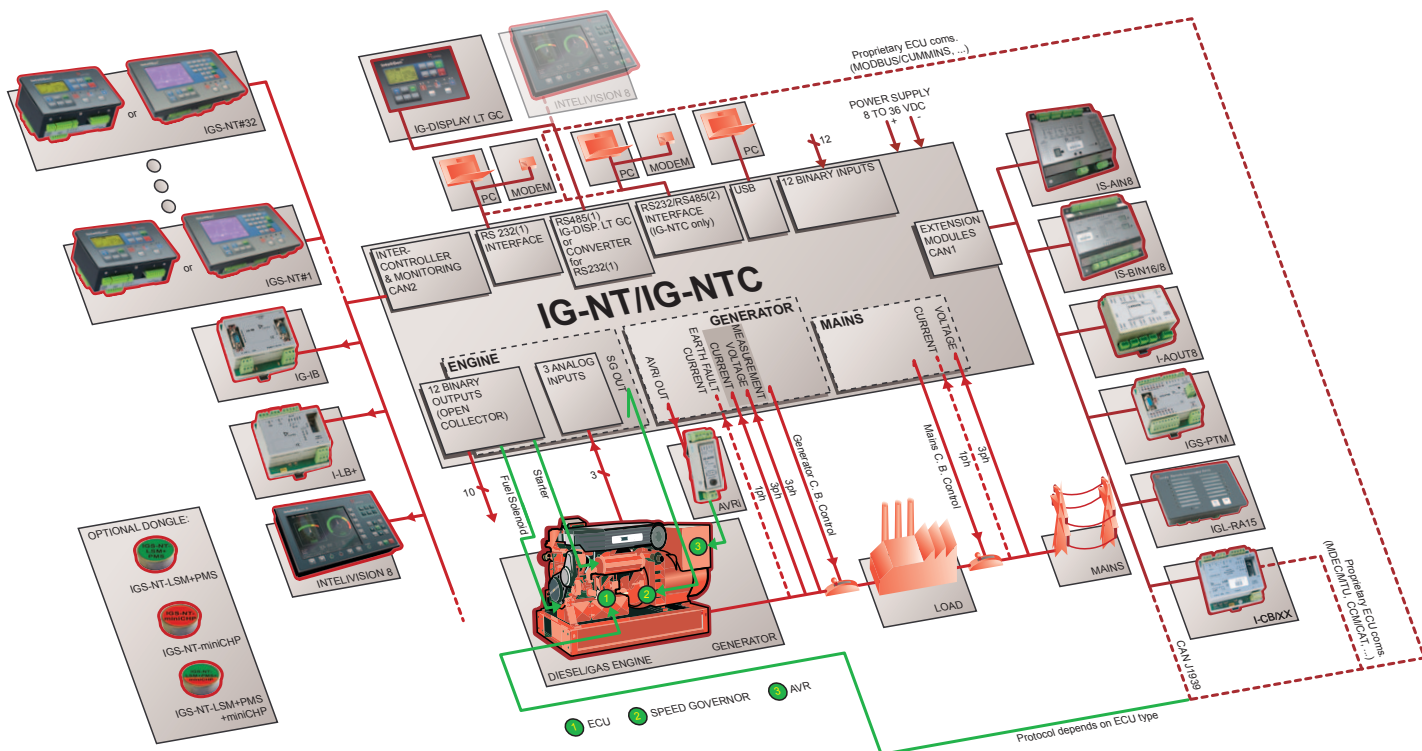
- ▶ 3 phase integrated generator protections (U + f)
- ▶ IDMT overcurrent + Shortcurrent protection
- ▶ Overload protection
- ▶ Reverse power protection
- ▶ Earth fault protection
- ▶ 3 phase integrated mains protections (U + f)
- ▶ Vector shift protection
- ▶ All binary/analog inputs free configurable for various protection types: HistRecOnly / Alarm Only / Alarm + History indication / Warning / Off load / Slow stop / BreakerOpen&Cooldown / Shutdown / Shutdown override / Mains protect / Sensor fail
- ▶ Phase rotation and phase sequence protection
- ▶ Additional 160 programmable protections configurable for any measured value to create customer-specific protections
- ▶ Application security

ANSI CODES

ANSI code	Protection	ANSI code	Protection
59	Overvoltage	51N+64	Earth
27	Undervoltage	32R	Reverse power
47	Voltage asymmetry	25	Synchronism check
81H	Overfrequency	47	Phase rotation
81L	Underfrequency	37	Undercurrent*
50+51	Overcurrent	55	Power factor*
46	Current unbalance	71	Gas (fuel) level
32	Overload		

* can be created using universal protections

Schematic diagram



Communication modules and PC tools

- ▷ **I-CB** – CAN repeater module
- ▷ **IG-IB** – Internet bridge
- ▷ **I-LB+** – Local bridge
- ▷ **I-CB** – ECU communication bridge
- ▷ **InteliMonitor** – PC monitoring tool
- ▷ **InteliSupervisor** – PC tool for Gen-set or machines fleet management
- ▷ **WinScope** – Special graphical controllers' monitoring software
- ▷ **GenConfig** – PC configuration tool

Extension modules and remote displays

- ▷ up to 4x **I-AOUT8** – Analog output extension module
- ▷ **IGL-RA15** – Remote annunciator
- ▷ up to 4x **IGS-PTM** – Analog/binary input/output module
- ▷ up to 10x **IS-AIN8** – Analog input module
- ▷ up to 10x **IS-AIN8TC** – Analogue input module for thermocouples
- ▷ up to 6x **IS-BIN16/8** – Binary input/output module
- ▷ up to 5x **InteliVision 8** – Controller colour display unit
- ▷ **IG-Display LT GC** – Additional remote display

Upgrade kits

- ▷ **IGS-NT-LSM+PMS dongle:**
 - Enables Multiple isolated parallel or multiple parallel with mains
 - Power management operation (with CAN bus)
 - Digital Load Sharing
 - Digital VAr Sharing
- ▷ **IGS-NT-miniCHP dongle:**
 - More PLC functions
- ▷ **IGS-NT-LSM+PMS+miniCHP dongle:**
 - Combination of the both dongles

HW modification codes

- ▷ Order code IG-NT (LT) (GC) (Marine) or IG-NTC (LT) (GC) (Marine)

LT = Low Temperature; display equipped with heating foil for operation down to -40°C

GC = Graphical Characters; one additional font (12x12, e.g. Chinese or Korean) can be used on the display

Marine = Type approved version for Marine

Typical application

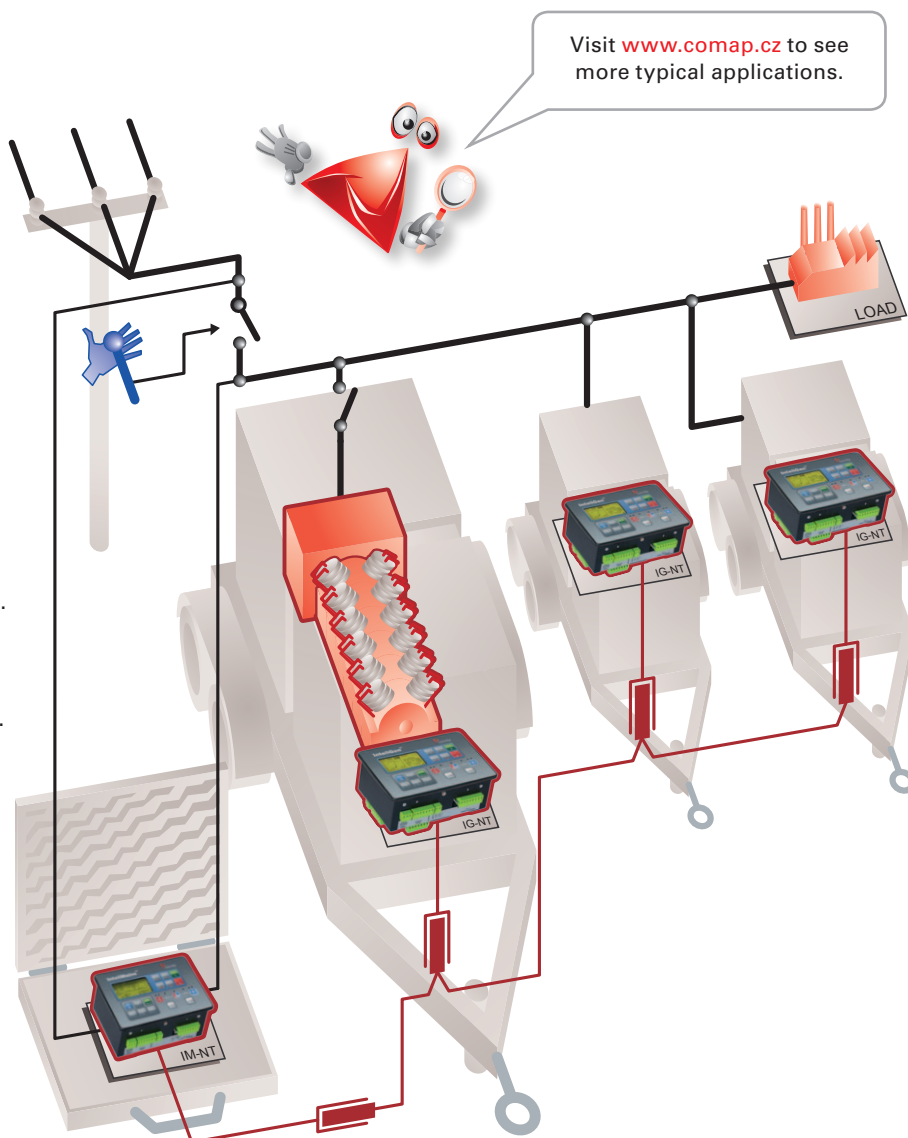
RENTAL SETS

Description:

- ▷ Containerized rental gen-sets can be used for maintenance of power lines without interruption of power delivery to end consumer.
- ▷ Gen-sets are connected one-by-one to mains at the consumer's end and manually loaded. Power line is then manually disconnected and consumer is powered from generators running in parallel.
- ▷ The group of gen-sets is reverse synchronized to mains after finalization of maintenance on power line. InteliMains^{NT} keeps generators and mains in synchronism enabling manual reconnection to power line.
- ▷ InteliMains^{NT} is built in a small shock proof suitcase.
- ▷ Interconnection of containers is done by color coded not-interchangeable connectors.
- ▷ Each gen-set can be used in Stand-by, Single parallel to mains and Multiple parallel modes according to the position of Mode selector switch.
- ▷ Frequency selector enables switching between 50Hz/230V and 60Hz/277V mains.

Scope of supply:

- ▷ 3x InteliGen^{NT}
- ▷ 3x IGS-NT-LSM+PMS dongle
- ▷ 3x IG-AVRi
- ▷ 3x IG-AVRi-TRANS/LV
- ▷ 1x InteliMains^{NT}



InteliGen^{NT} RELATED PRODUCTS

InteliGen^{NT} Marine

HIGH-END MARINE CERTIFIED GEN-SET CONTROLLER

- ▶ InteliGen^{NT} Marine is a comprehensive controller for both single and multiple gen-sets operating in standby or parallel modes for marine applications.

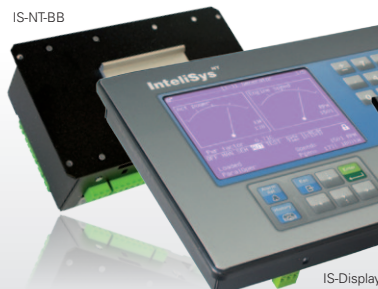


InteliSys^{NT}

PREMIUM AND COGENERATION GEN-SET CONTROLLER

- ▶ InteliSys^{NT} is an expandable controller for both single and multiple gen-sets operating in standby or parallel modes, especially in cogeneration (CHP) and other complex applications.
- ▶ InteliSys^{NT} = IS-NT-BB + IS-Display or IS-NT-BB + InteliVision 8

IS-NT-BB



or



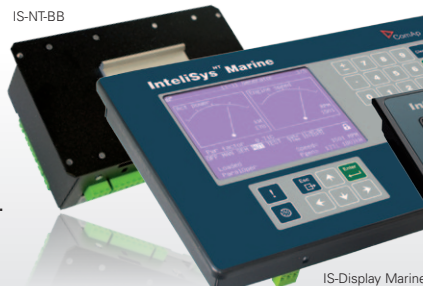
InteliVision 8

InteliSys^{NT} Marine

PREMIUM MARINE CERTIFIED GEN-SET CONTROLLER

- ▶ InteliSys^{NT} Marine is an expandable controller for both single and multiple gen-sets operating in standby or parallel modes for marine applications.
- ▶ InteliSys^{NT} Marine = IS-NT-BB + IS-Display Marine or IS-NT-BB + InteliVision 8

IS-NT-BB



or



InteliVision 8



InteliMains^{NT}

MAINS SUPERVISION CONTROLLER

- ▶ InteliMains^{NT} is designed for multiple (up to 31) gen-sets operating in parallel to mains. The InteliMains^{NT} controller connects the group of gen-sets to the mains. It can serve as a bus-tie synchronizing controller between two groups of gen-sets.



MANUFACTURER:

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LOCAL DISTRIBUTOR / PARTNER:



Customer satisfaction is our mission. We continuously develop the best people to succeed in our mission.

InteliVision

CONTROLLER DISPLAY UNIT



Description

InteliVision is a new generation display unit for either InteliGen^{NT} / InteliSys^{NT} or InteliDrive controllers. It is designed as a simple, easy to use Plug and Play solution and has been developed from our original IS-Display.

The new InteliVision screen features many significant improvements such as the large high-resolution colour TFT display, which helps visibility and definition for onscreen information. The control interface has also been updated with user-friendly intuitive active buttons - giving users access to more information in less time. InteliVision also features our unique TRENDS monitoring as a standard feature, helping you evaluate past events easily on one screen.

The InteliVision cut-out size is the same as the IS-Display (InteliSys^{NT}), so InteliVision can be easily used as a replacement for (or an alternative to) IS-Display. Regardless of the size it can be also used as a replacement for (or an alternative to) IG-Display or I-RD-CAN.

InteliVision includes ComAp's standard communication interface using RS232/485 and CAN bus communication. Designed to be mounted in both monitoring and engine room, InteliVision gives complete access to all control functions when connected to InteliGen^{NT} / InteliSys^{NT} or InteliDrive controllers.

Benefits

- ▶ Large, high-resolution screen
- ▶ Colour TFT display
- ▶ TRENDS monitoring screen
- ▶ Simpler, faster and more intuitive control
- ▶ More information in less time
- ▶ Same dimensions as IS-Display (InteliSys^{NT})
- ▶ IS-NT-BB can be mounted to the rear side of InteliVision
- ▶ Plug and Play operation (auto configuration based on controller application)
- ▶ Universal solution for both controller families - IGS-NT and ID
- ▶ Direct connection to the controller (converters are not needed)

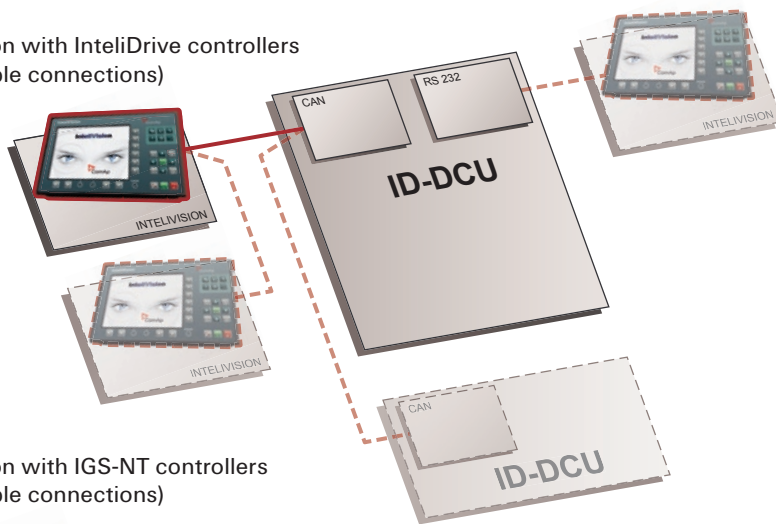


ComAp is a member of AMPS
(The Association of Manufacturers
of Power generating Systems).

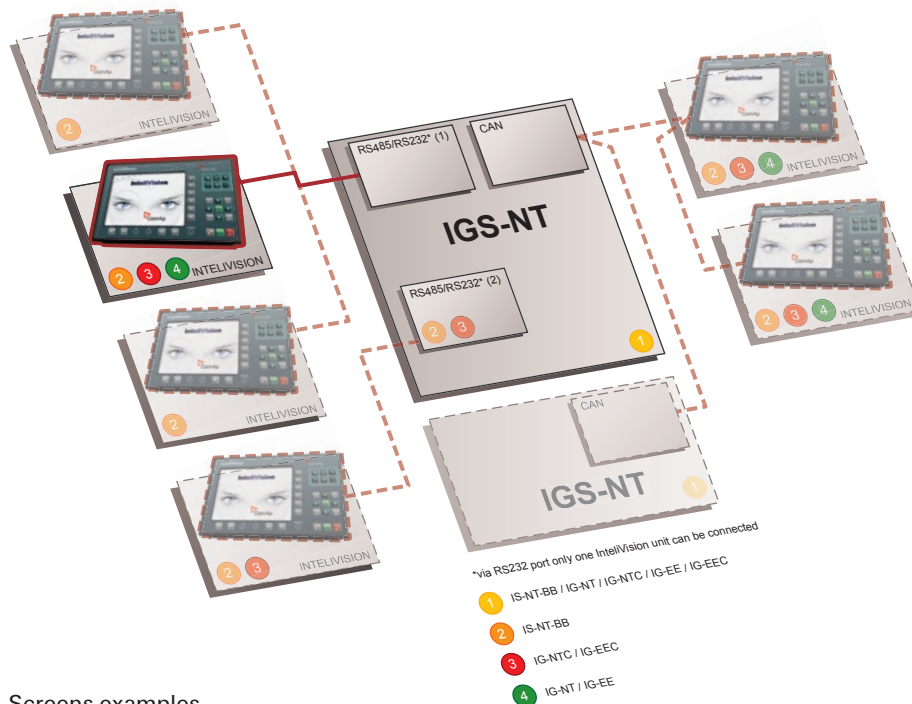


ComAp products meet the highest standards, with every stage of production undertaken in accordance with the ISO certification obtained in 1998.

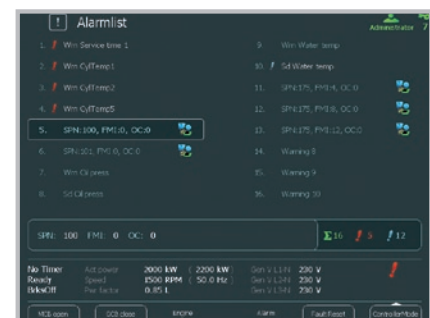
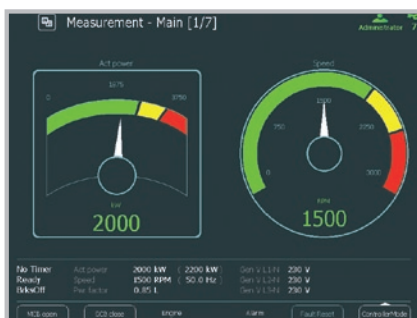
InteliVision with InteliDrive controllers (all possible connections)



InteliVision with IGS-NT controllers (all possible connections)



Screens examples



Features

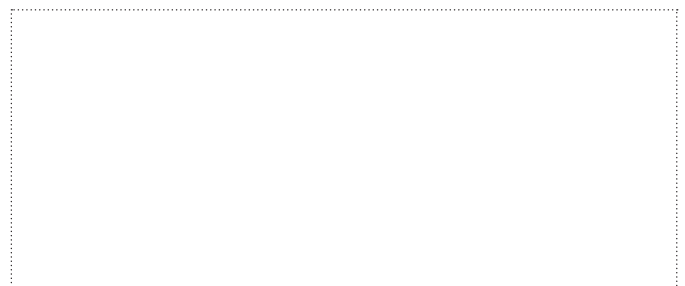
- ▶ 8" colour TFT display with resolution of 800 × 600 pixels
- ▶ Controlled by active buttons
- ▶ Comes with new TRENDS monitoring screen
- ▶ Windows CE operating system
- ▶ Same language support as InteliGen^{NT} / InteliSys^{NT} and InteliDrive
- ▶ Screen configuration by customer – export to XML format with subsequent manual screen modification and import back to the controller (as IS-Display)
- ▶ This display gives complete access to all control and monitoring functions of InteliGen^{NT} / InteliSys^{NT} and InteliDrive
- ▶ Intended for connection to ONE controller (InteliGen^{NT} / InteliSys^{NT} or InteliDrive type)
- ▶ The same dimensions as IS-Display / InteliSys^{NT} (including cut out dimensions)
- ▶ It is possible to mount IS-NT-BB to the rear side of InteliVision
- ▶ Can be used as a replacement for IG-Display, IS-Display or I-RD-CAN
- ▶ Connection to a controller via RS232/485 and CAN bus
- ▶ Auto configuration based on controller application (as IS-Display)
- ▶ Designed to be mounted in both monitoring and engine room
- ▶ Operating temperature from -20 to + 70°C (-4/158°F)
- ▶ CE certification
- ▶ Sealed to IP65



MANUFACTURER:

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Czech Republic
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Fax: + 420 266 316 647
E-mail: info@comap.cz
Internet: www.comap.cz

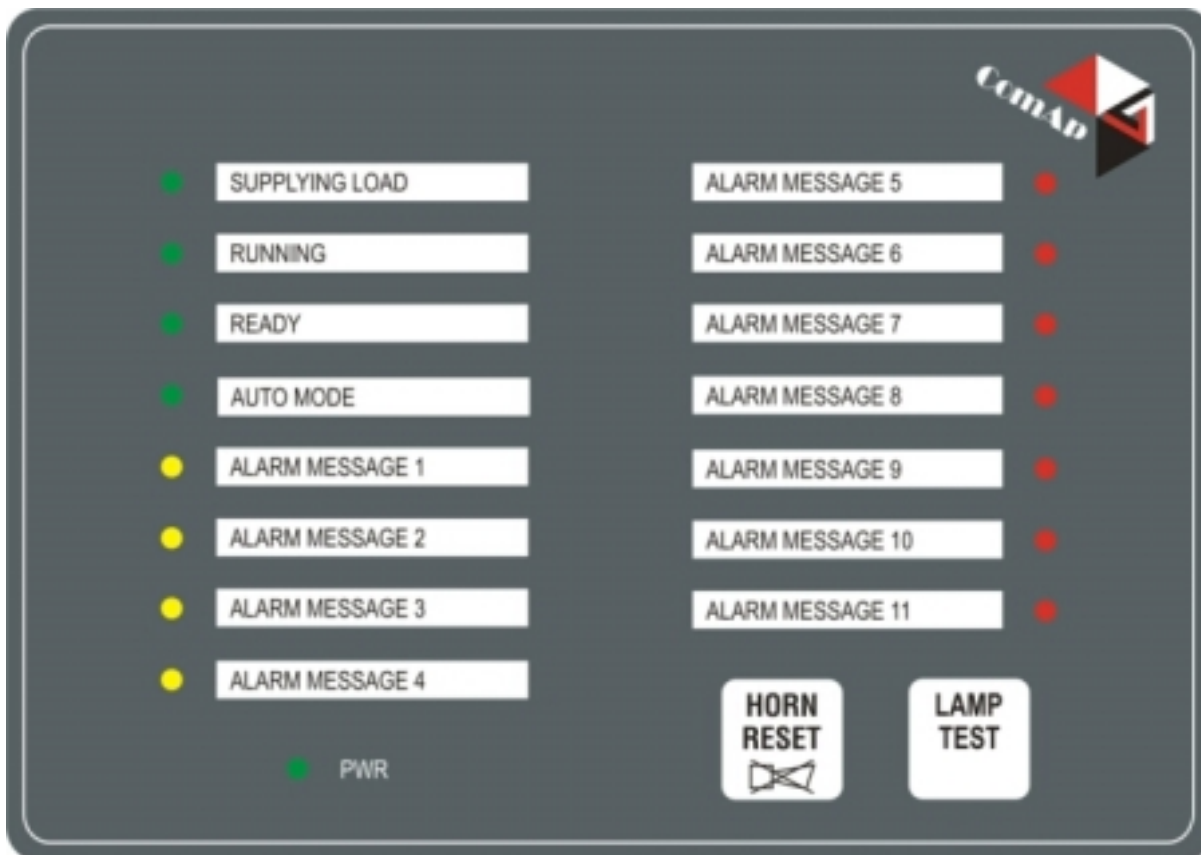
LOCAL DISTRIBUTOR / PARTNER:



Modules

Kit 1: iGL-RA15, Remote Annuciation Module

When NFPA110 approval is required the RA15 can be added for remote annunciation. Pictures and features of the RA15 can be seen below.



Kit 1: iGL-RA15, Remote Annunciation Module

- 15 three-color LEDS
- User definable labeling
- LED color is determined using the front panel buttons(R/G/Y)
- CAN Bus connection to unit
- 1 connection for siren
- Horn reset and lamp test keys
- Max. Distance is 200m

Please see next page

PROVIDE REMOTE E-STOP SWITCH PER 263213D,2.5,G

Non-illuminated E-Stop Pushbuttons (Assembled)



Contacts	Ø29mm Head Pushlock Turn Reset		Ø40mm Head Pushlock Turn Reset	
	Plastic Bezel	Metal Bezel	Plastic Bezel	Metal Bezel
<i>Operator Only</i>	HW1B-V3⓪†	HW4B-V3⓪†	HW1B-V4⓪†	HW4B-V4⓪†
1NO	HW1B-V3F10-⓪†	HW4B-V3F10-⓪†	HW1B-V4F10-⓪†	HW4B-V4F10-⓪†
1NC	HW1B-V3F01-⓪†	HW4B-V3F01-⓪†	HW1B-V4F01-⓪†	HW4B-V4F01-⓪†
1NO-1NC	HW1B-V3F11-⓪†	HW4B-V3F11-⓪†	HW1B-V4F11-⓪†	HW4B-V4F11-⓪†
2NO	HW1B-V3F20-⓪†	HW4B-V3F20-⓪†	HW1B-V4F20-⓪†	HW4B-V4F20-⓪†
2NC	HW1B-V3F02-⓪†	HW4B-V3F02-⓪†	HW1B-V4F02-⓪†	HW4B-V4F02-⓪†



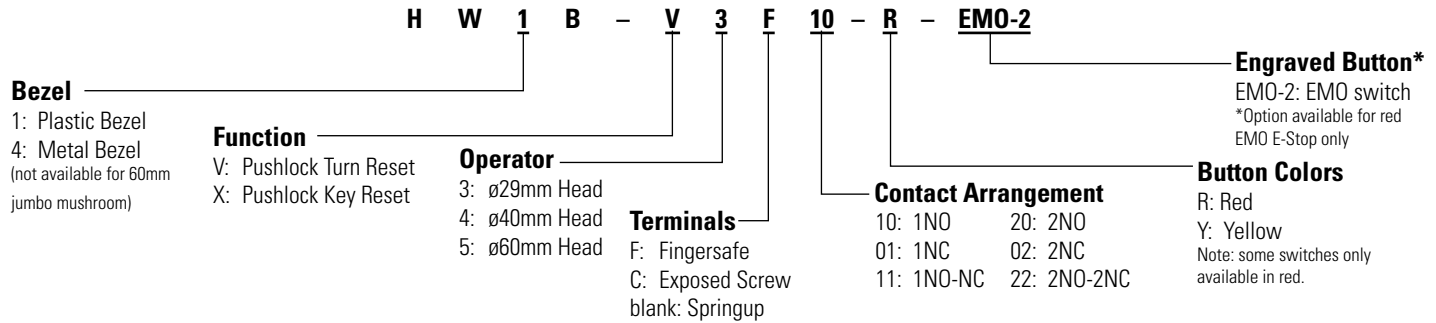
Contacts	Ø40mm Head EMO Pushlock Turn Reset		Ø40mm Head Pushlock Key Reset	
	Plastic Bezel	Metal Bezel	Plastic Bezel	Metal Bezel
<i>Operator Only</i>	HW1B-V4R-EMO-2*	HW4B-V4R-EMO-2*	HW1B-X4R*	HW4B-X4R*
1NO	HW1B-V4F10-R-EMO-2*	HW4B-V4F10-R-EMO-2*	HW1B-X4F10-R*	HW4B-X4F10-R*
1NC	HW1B-V4F01-R-EMO-2*	HW4B-V4F01-R-EMO-2*	HW1B-X4F01-R*	HW4B-X4F01-R*
1NO-1NC	HW1B-V4F11-R-EMO-2*	HW4B-V4F11-R-EMO-2*	HW1B-X4F11-R*	HW4B-X4F11-R*
2NO	HW1B-V4F20-R-EMO-2*	HW4B-V4F20-R-EMO-2*	HW1B-X4F20-R*	HW4B-X4F20-R*
2NC	HW1B-V4F02-R-EMO-2*	HW4B-V4F02-R-EMO-2*	HW1B-X4F02-R*	HW4B-X4F02-R*



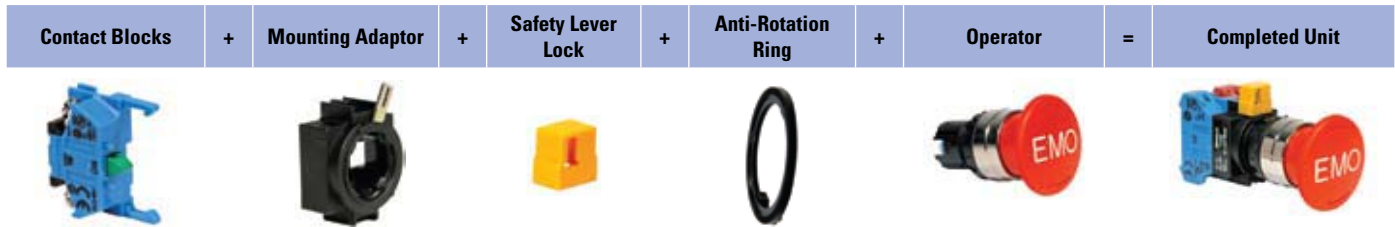
- * Available in Red only.
- † Available in red or yellow. Insert color code in place of ⓪ (R: Red, Y: Yellow).
- For accessories, see page 549.
- For dimensions, see page 551.
- For nameplates and shrouds, see page 550.
- For contact assembly part numbers, see page 550.
- All HW series E-stops comply with EN418, the IEC "E-Stop Addendum to the Low Voltage Directive," this includes "tamper proof" operation whereby a change of contact state is not possible by "teasing" or "floating" the operator.
- All assembled part numbers in catalog include standard fingersafe (HW-F...) contacts.
- Assembled units with spring-up terminals (HW-G...) can be ordered by removing an "F" from the part number (Ex. HW1B-M1F11-R becomes HW1B-M111-R).
- Units with exposed screw terminals (HW-C...) must be ordered as sub-components.
- Operator only models include operator and button.
- Additional contact configurations available (up to 6 total contacts).

Contacts	ø60mm Head Pushlock Turn Reset
	Plastic Bezel
<i>Operator Only</i>	HW1B-V5R*
1NO	HW1B-V5F10-R*
1NC	HW1B-V5F01-R*
1NO-1NC	HW1B-V5F11-R*
2NO	HW1B-V5F20-R*
2NC	HW1B-V5F02-R*

Part Number Structure



Non-illuminated E-Stop Pushbuttons (Replacement Parts)



Contact Blocks

Style	Contacts	1NO	1NC
	Standard Fingersafe (IP20)	HW-F10	HW-F01
		HW-F10R (early make)	HW-F01R (late break)
	Spring-Up Terminal	HW-G10	HW-G01
		HW-G10R (early make)	HW-G01R (late break)
	Exposed Screw Terminal	HW-C10	HW-C01
		HW-C10R (early make)	HW-C01R (late break)
	Dummy Block	TW-DB	

Contact Block Mounting Adaptor

Style	Part Number
	HW-CB2C



- Used to mount contact blocks to operator.
- IDEC strongly recommends using the safety lever lock to prevent heavy vibration or maintenance personnel from inadvertently unlocking contacts.

Safety Lever Lock

Style	Part Number
	HW9Z-LS

Anti-Rotation Ring

Appearance	Part Number
	HW9Z-RL



Use with notched panel cutout to prevent unit rotation.

Operators

Style	Plastic		Metal
ø29mm Head Pushlock Turn Reset 	red	HW1B-V3R	HW4B-V3R
	yellow	HW1B-V3Y	HW4B-V3Y
ø40mm Head Pushlock Turn Reset 	red	HW1B-V4R	HW4B-V4R
	yellow	HW1B-V4Y	HW4B-V4Y
ø40mm Head EMO Pushlock Turn Reset* 		HW1B-V4R-EMO-2	HW4B-V4R-EMO-2
ø40mm Head Pushlock Key Reset* 		HW1B-X4R	HW4B-X4R
ø60mm Head Pushlock Turn Reset* 		HW1B-V5R	—



- *Available in red only.
- All E-Stop buttons are not removable from the operator.

Powerpack® M-Frame Molded Case Circuit Breakers

Offering improved performance and efficiency

Powerpack M-Frame Molded Case Circuit Breakers provide improved performance and a compact solution for up to 800A applications. They complement the existing Powerpack P- and R-Frame, and replace the traditional MA/MH Circuit Breakers with smaller footprint and competitive cost.



Unit Mount Configurations



I-Line® Configurations

Full-Featured Performance

- Approximately 15% smaller installed volume than the MA/MH Circuit Breakers
- Same dimensions, common mounting, bussing, cabling and door cut-out as Powerpack P-Frame Circuit Breaker
- Share common accessories with Powerpack P-Frame Circuit Breaker and can be field installed easily
- Built-in electronic trip unit type ET 1.0 provides better accuracy over standard thermal-magnetic trip unit
- Fixed long-time and adjustable instantaneous protection (2 to 10 times nominal Amps rating) is standard on all Powerpack M-Frame Circuit Breakers
- Connection options, including bus, standard lug, crimp lug and distribution lug, are available for installation flexibility
- Various padlocking and key-lock options are available to comply with OSHA requirements
- Dual rated UL489 and IEC 60947-2
- Available 300A, 350A, 400A, 450A, 500A, 600A, 700A and 800A ratings
- Available in 2- and 3-pole unit-mount and I-Line versions
- Two levels of interrupting ratings available

Standard	Voltage (V)	Int. Rating G (kA)	Int. Rating J (kA)
UL	240	65	100
	480	35	65
	600	18	25
IEC Icu/Ics	240	50/25	65/35
	415	35/20	50/25

Powerpack® M-Frame Molded Case Circuit Breakers

Features Comparison

Features	Square D® MA/MH	Square D Powerpack M	Square D Powerpack P
Amp Rating	300A – 1200A	300A – 800A	250A – 1200A
2P and 3P	Yes	Yes	Yes
Interrupting Rating (kA) (240/480/600 V)	MA: 42/30/22 MH: 65/65/25	G: 65/35/18 J: 100/65/25	G: 65/35/18 J: 100/65/25 K: 65/50/50 L: 125/100/-
Dual Rated UL 489/ IEC 947-2	Yes	Yes	Yes
Trip Unit Protection	Thermal-Mag (fixed Thermal)	LI (fixed long time pick-up)	LI/LSI/LSIG
Trip Unit Power Measurement	No	No	Yes
Trip Unit Communication	No	No	Yes (Modbus – open protocol)
Interchangeable Trip Units	No	No	Yes
80/100% Rating	80%	80%	80 or 100%
Motor Operator/ Electrically Operated	Yes	No	Yes
Drawout	No	No	Yes
Dimensions (inch) H x W x D	14 x 9 x 5	12.8 x 8.3 x 5.8	12.8 x 8.3 x 5.8
Weight (lbs.)	34	30	32

Powerpack M-Frame Circuit Breaker Accessories

- Shunt Trip (various AC and DC voltages are available)
- Undervoltage Trip (various AC and DC voltages are available)
- Time Delayed Undervoltage Trip (various AC and DC voltages are available)
- Auxiliary Switches (up to 3A/3B switches); Low-level (Volts and Amps) switches are also available
- Alarm Switch (1A/1B); Low-level (Volts and Amps) switch is also available
- Standard Mechanical Lug (aluminum or copper)
- Crimp (compression) Lug (aluminum or copper)
- Power Distribution Lug (aluminum)
- Bus Connector Kit
- Inter-Phase Barriers
- Door Escutcheons (for toggle or accessory cover)
- Padlocking Device (removable or fixed version)
- Key-lock Device (Kirk or Federal Pioneer)

**Contact your Square D® sales representative for additional information.
Or, visit www.us.squared.com**

Schneider Electric - North American Operating Division

1415 S. Roselle Road
Palatine, IL 60067
Tel: 847-397-2600
Fax: 847-925-7500

Silencer Selection

Call Silex for immediate assistance in selecting the appropriate silencer that best suits your application's acoustical and backpressure requirements or consult the silencer selection guide in our catalogue. You can also use Silex's exclusive Silencer Sizing and Selection Program "Silex Digital Engineer" found on the Company's secure website at www.silex.com.

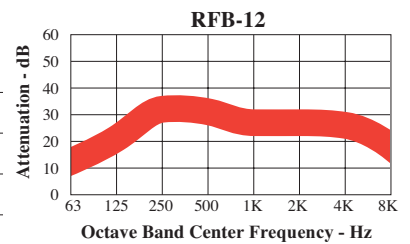
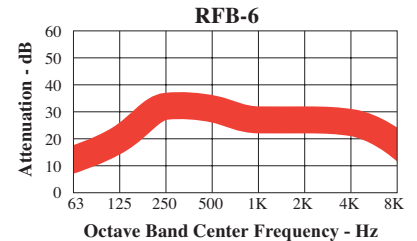
Application & Performance

Compact Critical Grade series silencers are combination type silencers and are designed specifically for enclosures and marine applications where space is limited. Silencers are manufactured from light to heavy gauge steel and finished with high temperature black paint. Standard slip-on inlet up to 6", Flange inlet from 8" - 12". Flanges are ANSI 125/150#. Standard tube outlet on all sizes.

Dimensions

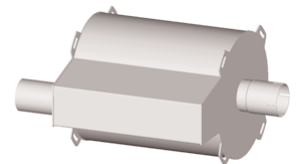
Model	A In	B In (mm)	C In (mm)	D In (mm)	E In (mm)	F In (mm)	G In (mm)	Wgt. Lbs (Kg)
RFB-1.5	1.5 (38)	8.88 (226)	11.50 (292)	6.25 (159)	5.75 (146)	3.75 (95)	3 (76)	17 (8)
RFB-2	2.0 (51)	8.88 (226)	11.88 (302)	8.25 (210)	6.00 (152)	4.00 (102)	3 (76)	21 (10)
RFB-2.5	2.5 (64)	12 (305)	15.38 (391)	10 (254)	7.82 (199)	5.5 (140)	3 (76)	34 (16)
RFB-3	3.0 (76)	16.00 (406)	19.94 (506)	11.25 (286)	9.81 (249)	7.50 (191)	4 (102)	50 (21)
RFB-3.5	3.5 (89)	16.00 (406)	20.50 (521)	13.50 (343)	10.13 (257)	7.50 (191)	4 (102)	61 (28)
RFB-4	4.0 (102)	16.00 (406)	21.00 (533)	17.50 (445)	10.31 (261)	7.50 (191)	5 (127)	72 (33)
RFB-4.5	4.5 (115)	18 (458)	23.25 (591)	18.5 (470)	11.38 (290)	8.5 (216)	5 (127)	87 (40)
RFB-5	5.0 (127)	19.50 (495)	25.50 (648)	19.50 (495)	12.50 (318)	9.50 (241)	5 (127)	120 (54)
RFB-6	6.0 (152)	19.50 (495)	26.75 (679)	25.50 (648)	13.13 (334)	9.50 (241)	5 (127)	172 (78)
RFB-8	8.0 (203)	26.50 (673)	35.50 (902)	27.50 (699)	17.38 (441)	12.50 (318)	5 (127)	295 (134)
RFB-10	10.0 (254)	34.00 (864)	45.13 (1146)	33.50 (851)	22.25 (565)	16.00 (406)	5 (127)	500 (227)
RFB-12	12.0 (305)	40.00 (1016)	52.88 (1343)	40.50 (1029)	25.94 (659)	19.00 (483)	5 (127)	782 (355)

Typical Attenuation Curve

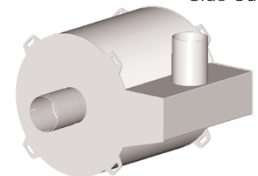


Typical Orientations

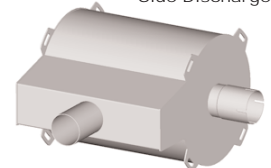
Straight Through (ST)



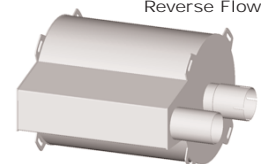
Side Out (SO)



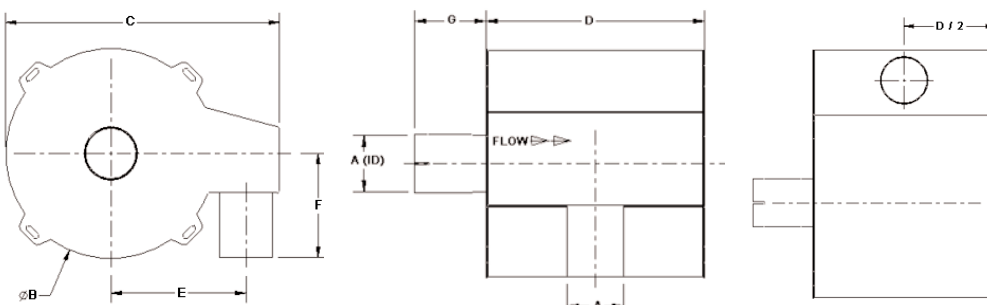
Side Discharge (SD)



Reverse Flow (RF)



Products shown in counterclockwise position. Also available in clockwise



Options

- Aluminized steel, 304, 316 or 316L stainless steel, Corten Steel
- Custom inlet/outlet configurations
- Thermal insulation blankets to suit all configurations
- Sample part number RFB-4-CCW-ST-C-B

Metric dimensions rounded to nearest mm.

Dimensions and weights are nominal and may vary slightly in production models.

Silex Innovations Inc.
Phone 905 612 4000
Fax 905 612 8999
www.silex.com



Got Power? Generator Sales, Service & Rental

BILL OF MATERIAL FOR THE DAY TANK's

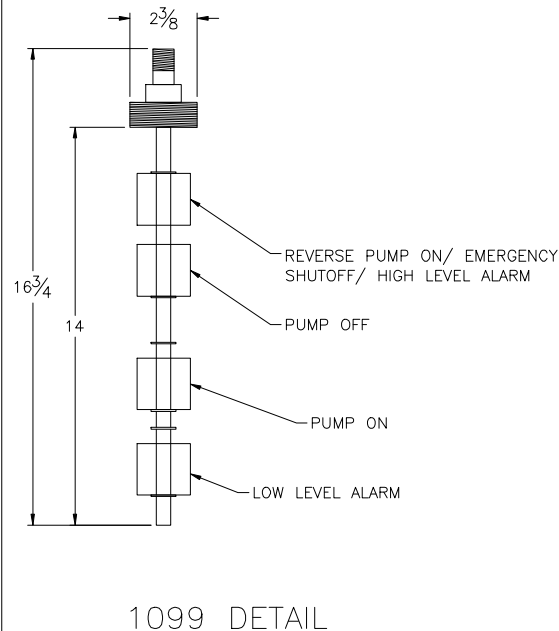
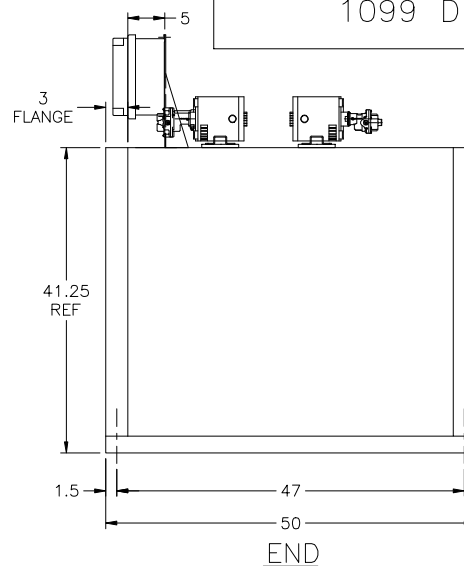
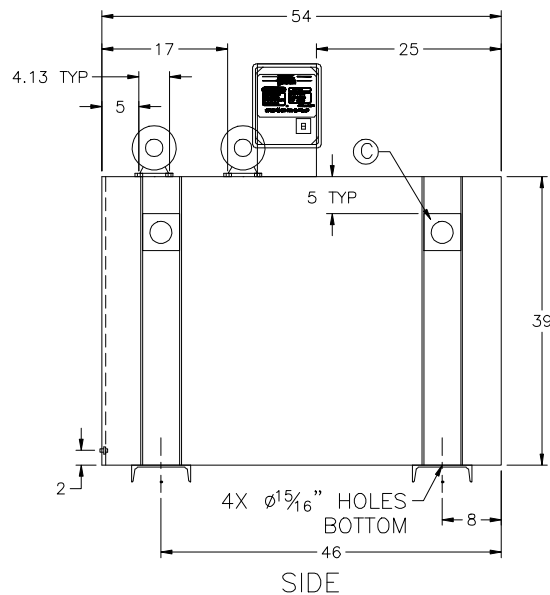
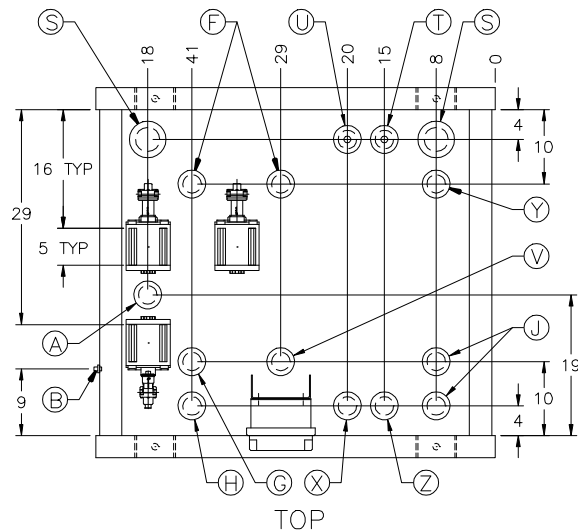
Quantity	Description	
(2)	SB20 - 250 Gallon Free Standing Day Tank UL #142 Listed	
Standard Features		
Quantity	Part #	Tank Dim: 39"H x 50"W x 54"L Wt: 1250#
1	DW-101	Double Wall Secondary Containment
1	3650	Dip Tube Supply/Return Fitting Package (1/2" NPT)
1	4300	Fuel in Basin Alarm (2" NPT, top mounted)
1	3502	Basin Drain (1/2" NPT)
1	3005	Locking Manual Fill Cap
1	1001	Krueger Fuel Level Gauge (2" NPT, swing arm)
1	3152	Standard Vent Cap (2" NPT)
2	3163	Emergency Pressure Relief Cap (3" NPT)
4	8410	Flush Mount Lifting Plate (minimum 4)
1	Black	Paint Color Black

Options Included:		
2	8310	C-Channel Basin Support per MDEQ (C8 x 11.5)
1	NFPA	NFPA Diamond Hazardous Material Decal for Diesel Fuel
1	700-0007	Label - Diesel Fuel Only
1	700-0009	Label - Combustible Liquids
1	Special	Label – Keep Fire Away
1	1060	(2) alarm panel mounted on day tank (Normal full & high level)
1	1099	Low/Pump On/Pump Off/High Float Assembly
1	1098	Lag Float (Set at 11") (For #2 supply pump control)
1	2010	Reverse Pumping System (pump mounted on day tank top)
1	6070	7 gpm Self Priming Pump, 3/8" Ports, 1/2 HP Motor 115 VAC
1	3600	1/2" Diptube (7" Long)
2	3195	Extra Piping Connection w/Plug (2" NPT) Spare

NOTE: This day tank includes a float sender to send signals to an existing Simplex pump controller, which controls existing duplex supply pumps. This controller must also control the reverse pump being supplied with this day tank.

JOB #	TANK CAPACITY	GENSET MODEL	GENSET FOOTPRINT	TANK WEIGHT
808566	250 GAL	X	X	X LBS

PRELIMINARY DRAWING



BILL OF MATERIAL			
LETTER	PART #	DESCRIPTION	QTY
S	3163	FLANGE, 3", E-VENT	2
T	3650R	FLANGE, 2", RETURN, W/ 1/2" DIP TUBE	1
U	3650S	FLANGE, 2", SUPPLY, W/ 1/2" DIP TUBE	1
V	1099	FLANGE, 2", HIGH/LOW/ON/OFF FLOAT ASSY	1
X	1001	FLANGE, 2", KRUEGER FUEL GAUGE	1
Y	3152	FLANGE, 2", STANDARD VENT	1
Z	3005	FLANGE, 2", LOCKING FILL PORT	1
A	4300	FLANGE, 2", FUEL IN BASIN ALARM	1
B	3502	FLANGE, 1/2", BASIN DRAIN	1
C	8410	1/4" FLUSH MOUNT LIFT PLATE	4
F	3600	FLANGE, 2", 1/2" DIP TUBE	2
G	1098	FLANGE, 2", LAG FLOAT	1
H	3600	FLANGE, 2", 1/2" DIP TUBE (7" LONG)	1
J	3195	FLANGE, 2", EXTRA FITTING W/ PLUG	2
	1382	SERIES 400 CONTROLLER FOR DUPLEX W/REVERSE PUMP & MOTOR	1
	2000	DUPLEX PUMPING SYSTEM	1
	6020	1/3 HP CARBONATE MOTOR, SINGLE PHASE	2
		115 / 230V, 60Hz, 48YZ FRAME	
		BRONZE CLOSE COUPLED 2 GPM	2
		ROTARY GEAR PUMP, 1/4" PORTS	
	2010	REVERSE PUMPING SYSTEM	1
	6040	1/2 HP CAPACITOR START MOTOR	1
		SINGLE PHASE, 115 / 230V, 60Hz, 48 FRAME	
		BRONZE CLOSE COUPLED 4 GPM	1
		ROTARY GEAR PUMP, 3/8" PORTS	
	700-1025	1/2" FUEL STRAINER (Y STYLE)	2
	700-1065	1/2" SPRING CHECK VALVE	2
	700-1096	SOLENOID VALVE (1/2", 120VAC, NC)	2
	8310	C8X11.5 C-CHANNEL BASIN SUPPORT	2
	MFFPA	DIAMOND HAZARDOUS MATERIAL DECAL- DIESEL	1
	00-0007	LABEL - DIESEL FUEL ONLY	1
	700-0009	LABEL - COMBUSTIBLE LIQUIDS	1
	SPECIAL	LABEL - KEEP FIRE AWAY	1
	DW-101	SECONDARY CONTAINMENT	
	BLACK	PAINT COLOR	

THIS AUTOCAD DRAWING IS THE PROPERTY OF GLOBAL POWER COMPONENTS AND MAY NOT BE USED IN ANY WAY DETRIMENTAL TO THE INTERESTS OF G.P.C. ANY MANUAL CHANGES WILL VOID THIS DRAWING. SPECIFICATIONS MAY CHANGE WITHOUT NOTICE. 1-1

REVISIONS				REVISIONS				SUB BASE TANK W/ RUPTURE BASIN & STUB UP		
REV	DATE:	CHANGE MADE	BY	REV	DATE:	CHANGE MADE	BY			
								CUSTOMER/ID: PM TECHNOLOGIES		
								JOB REF: WAYNE STATE UNIV.		
								DRAWING REF: X		
								DWG #: G-808566-TM		
								DATE: 01/04/12		
								DRAWN BY: DSD		File Numbers: 1018481 1046749 1015279



Standard 3 Year Standby Generator Set Comprehensive Warranty

Baldor's warranty applies to all products manufactured by Baldor which are for use in the United States. Baldor warrants that the product is to be free from defects in materials and workmanship to the original purchaser, for five (3) years or 1000 hours from date of delivery or start up.

Repair, replacement, or appropriate adjustment will be furnished if the defective part, upon Baldor's inspection, is found to be properly installed, maintained, and operated in accordance with specifications to which the product was manufactured and in accordance with instruction manuals furnished by Baldor. Labor for repair of a warrantable failure will be provided for three years from date of delivery not to exceed published rates as contained in the Baldor Warranty Policy. One service call per warrantable issue is allowable under the Warranty Policy.

This warranty does not apply to malfunctions caused by damage, unreasonable use, misuse, repair or service by unauthorized persons, or normal wear and tear. Any and all warranty repairs must be authorized by Baldor prior to completion. A Start-up Inspection Form must be completed and submitted to Baldor in its entirety within 30 days of start-up to qualify for any warranty consideration.

NO OTHER EXPRESS WARRANTY APPLIES. Any implied or statutory warranties, including any warranty of merchantability or fitness of purpose, is expressly limited to the duration of this warranty. In no event is Baldor liable for incidental or consequential damages.

This warranty shall not apply to cost of maintenance, adjustments, installation or start up; failures due to normal wear, accident, misuse, abuse, neglect or improper installation; additions, alterations or modifications not authorized in writing by Baldor; failures caused by defects in the system in which the set is installed; rental equipment/expense while repairs are being made; starting batteries, fuses, light bulbs, heating elements, engine fluids; components added to the set after shipment from Baldor.

This warranty shall not apply to block heaters or batteries after the first year.

No person is authorized to give any other warranties or to assume any other liabilities on Baldor's behalf.

All claims must be brought to the attention of Baldor or an authorized distributor within thirty (30) days of discovery of the part or parts failing to meet this warranty. No claims will be covered without advance authorization or following proper procedures.